

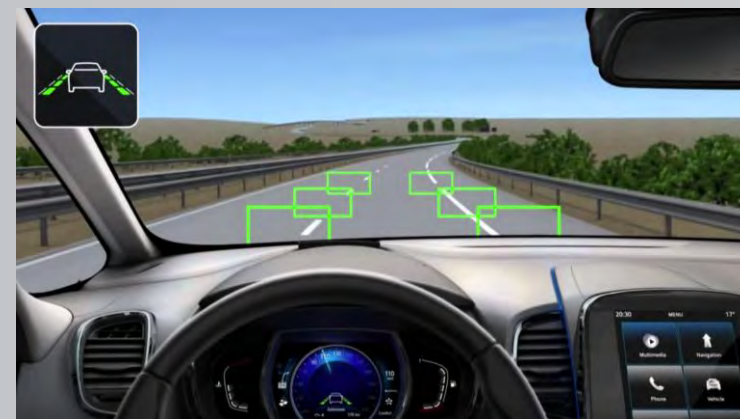
嵌入式系统当下无处不在

当下几乎所有的电子设备都包含有嵌入式系统

嵌入式系统也已被用于监测控制我们今天所驾驶汽车的多个性能

高可靠性的嵌入式系统也被部署在诸如飞行器驾驶座舱控制等应用中

数以百万计的低成本物联网，家用电器以及消费电子设备都是围绕嵌入式技术而设计



技术趋势

电子设计日趋复杂...

- FPGA 及高性能元器件
- 基于各种传感器的信号处理: 视频, 音频, 雷达, 加速度, 温度等
- 中央处理器速度日趋加快
- 电源管理技术越发先进
- 万物互联

低速串行总线不再低速!

串行总线和并行总线架构并存!



客户所面临的挑战

模拟数字信号混合，串行并行信号并存

- 时间的相关性
- 测量和印证传感器信号的动态范围

复杂系统的故障调试

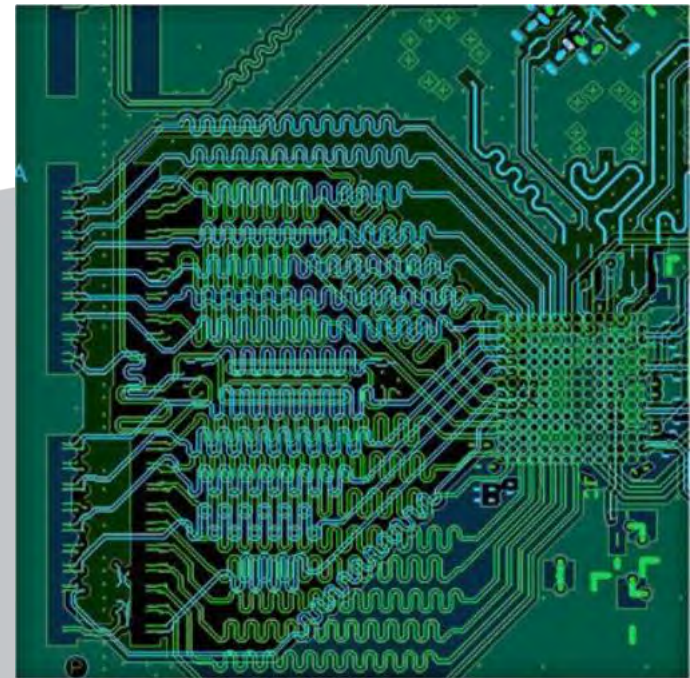
- 原因和结果相关性的深入探寻

高速低压信号

- 捕获高速信号，验证时间和噪声容限

以小博大

- 试验台空间有限
- 抢占市场
- 统计分析以证明可靠性和兼容性
- 预算的压力



使得市场对高易用性、高性价比的先进实验室设备需求日益增加！

PICO现有方案

PicoScope 6000 系列 – 2009年发布, 2013更新

- 250 – 500 MHz 带宽 & 1 GHz 数字化仪型号 (6407)
- 8-bit 垂直分辨率
- 4 通道
- 5 GS/s 采样率(通道共享)
- 2 GS 存储深度

仍然深受市场欢迎

- 高性价比
- 体积小巧便携
- 深存储 - 定位一些大存储需求的应用
- 完美的OEM应用方案:作为 嵌入式系统单元+SDK



但下一代系统的设计者们需要更多...

提供更多 . . .

PicoScope 6000E 系列



更多: 8 个模拟通道

+ 16 个数字通道 (MSO)

更深: 高达4 GS内存

更高: 500 MHz 带宽

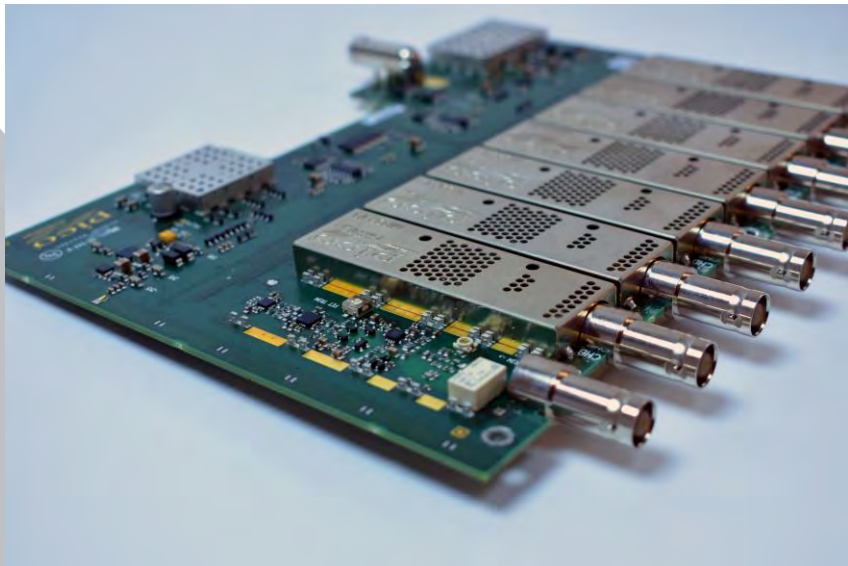
更准: 8/10/12-bit 柔性可调分辨率

更优: 多通道探头夹具系统

更好: 21 种串行解码软件标配

最棒: 物超所值!

内部构造 – 双主板设计



模拟主板

- 低噪音高精度通道
- 8 / 10 / 12 bit 可调分辨率 (**6824E**)
 - > 60 dB SFDR @ 100 MHz
- 8 bit 固定分辨率 (**6804E**)
 - > 50 dB SFDR @ 100 MHz



数字主板

- 2个5 GS/s A/D 转换器
- 2 或 4 GB DDR3 内存
- 任意波/函数发生器
- MSO 电路
- USB 3.0 高速接口

后面板



后面板

- 任意波/函数发生器: 14 bits垂直分辨率, 采样率 200 MS/s
- 外触发输入
- 10 MHz 外部时钟输入
- 低噪音风扇
- USB 3.0 高速接口
- 外部电源输入接口 (PS014 / PS016) & 接地

新型智能 BNC 探头接口



智能BNC探头:

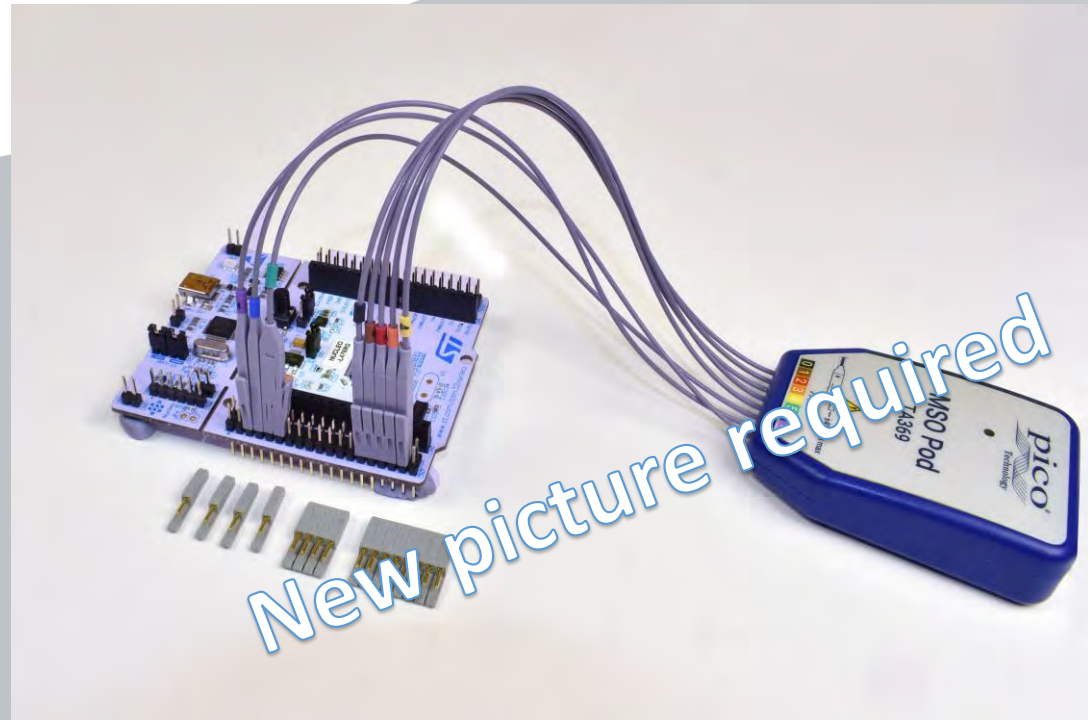


MSO 接口



有源 MSO 数字接口

- 每接口对应8通道
- 1 ns 最小脉冲宽度



数字探头

多种接头匹配兼容
Octal / Quad / Uni group 接头



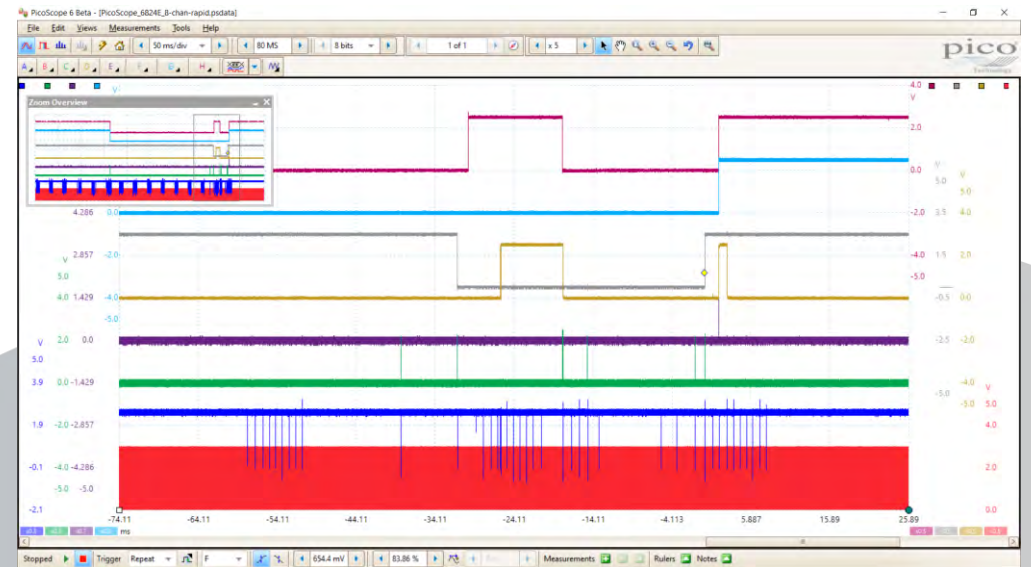
便携箱



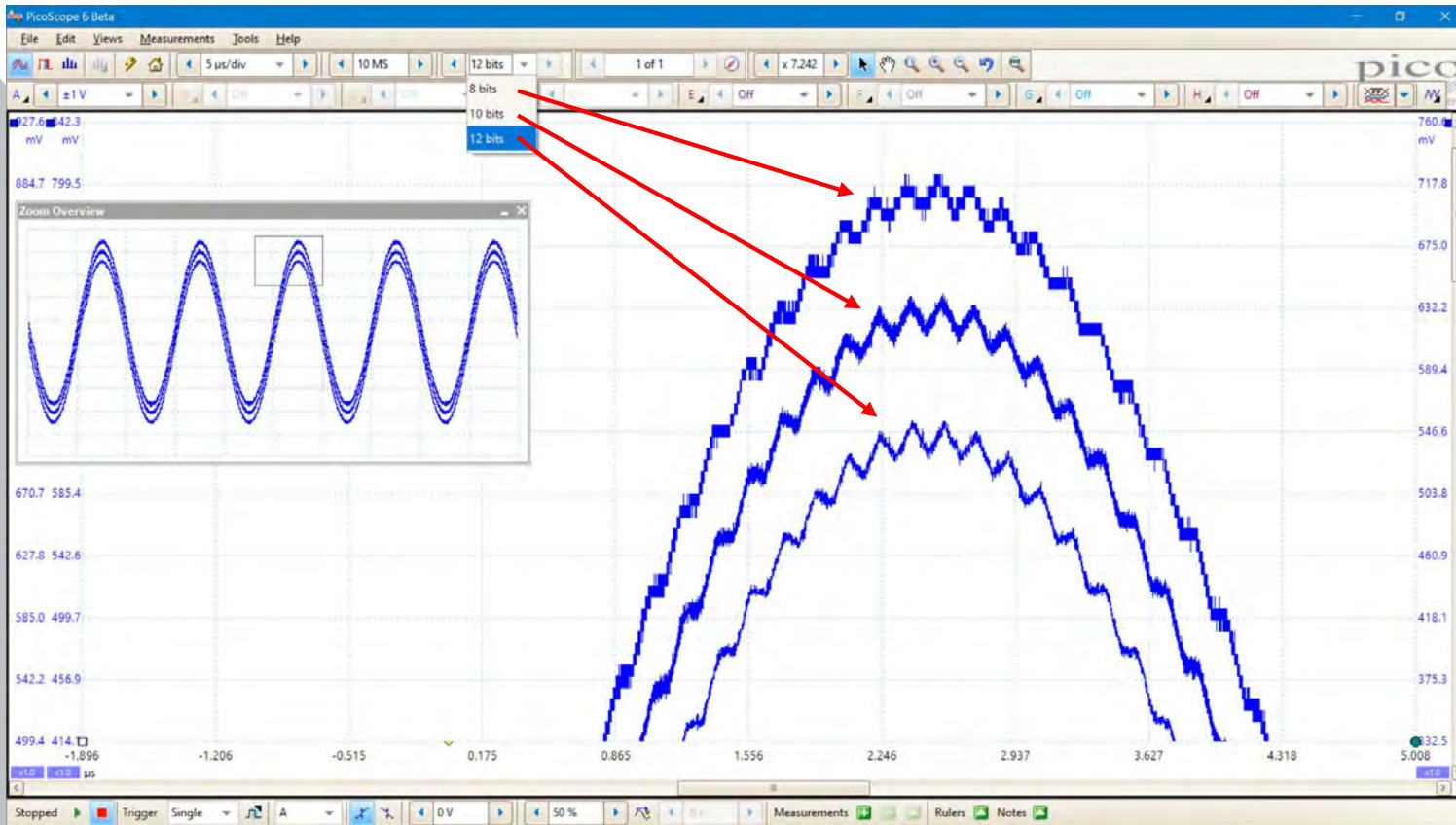
PicoScope 6 软件

久经验证且备受欢迎的用户界面-全球逾10万用户在使用!

- 易于应用 – 对各类工程师
- 先进的数字触发功能: 脉冲 / 欠幅 / 逻辑 等.
- 时域, 频域, 数字信号同时显示分析
- 21 种串行解码
 - 包含最新发布的: BroadR-Reach, Manchester, DALI
- 自动测量功能, 包含 DeepMeasure™
- 面板测试 & 报警
- 内存分区: 1 to 10,000
- 多语言: 22 种



8 / 10 / 12 bits 可调分辨率



分辨率和采样率对应关系:

- 8 bits
 - 1 & 2 channels @ 5 GS/s
 - 4 channels @ 2.5 GS/s
 - 8 channels @ 1.25 GS/s
- 10 bits
 - 1 channel @ 5 GS/s
 - 2 channels @ 2.5 GS/s
 - 4 channels @ 1.25 GS/s
 - 8 channels @ 625 MS/s
- 12 bits
 - 1 & 2 channels @ 1.25 GS/s

动态范围



6824E: > 60 dB SFDR

6804E: > 50 dB SFDR

(@ 100 MHz on +/- 50 mV range and above.)

最大采样率下的捕获时间

6824E 在 8 bit模式下:

单通道:

1 GS 内存 @ 5 GS/s = **200 ms**

- (800 ms with API)

双通道:

1 GS @ 5 GS/s = **200 ms**

- (400 ms with API)

四通道:

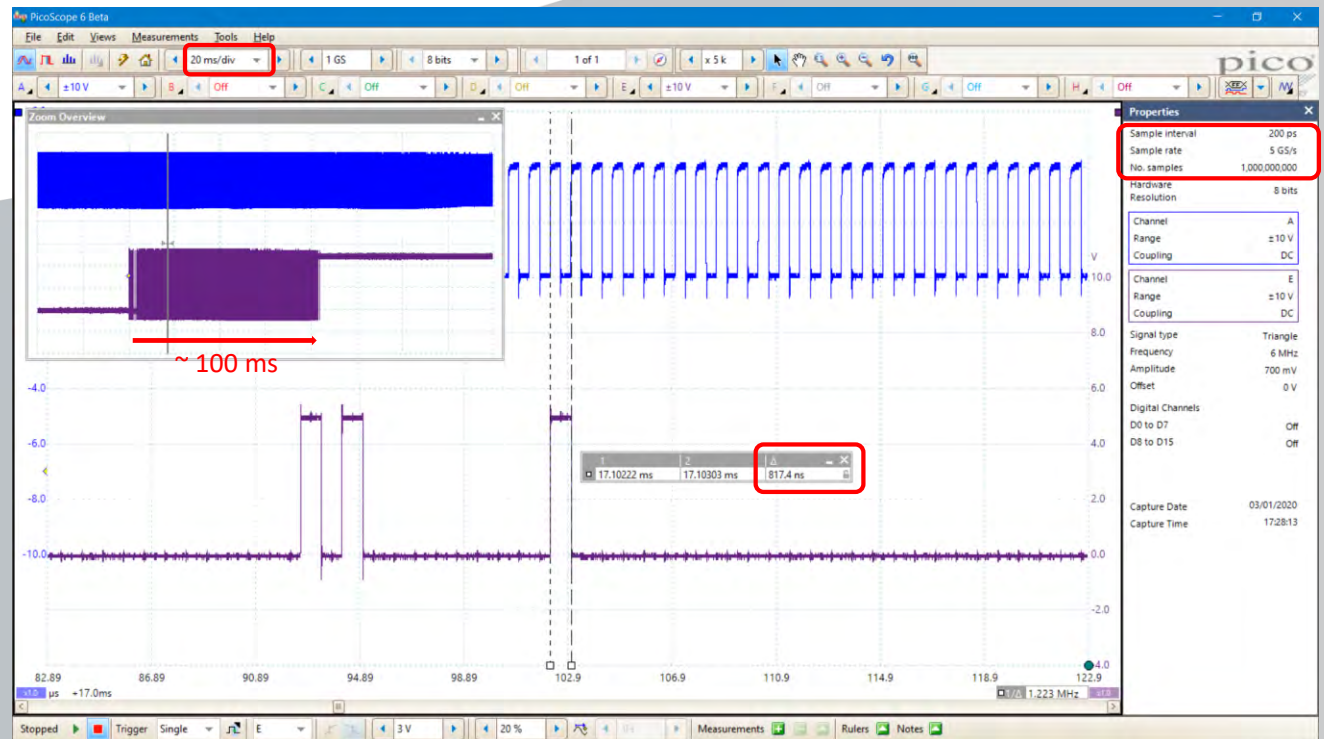
500 MS @ 2.5 GS/s = **200 ms**

- (400 ms with API)

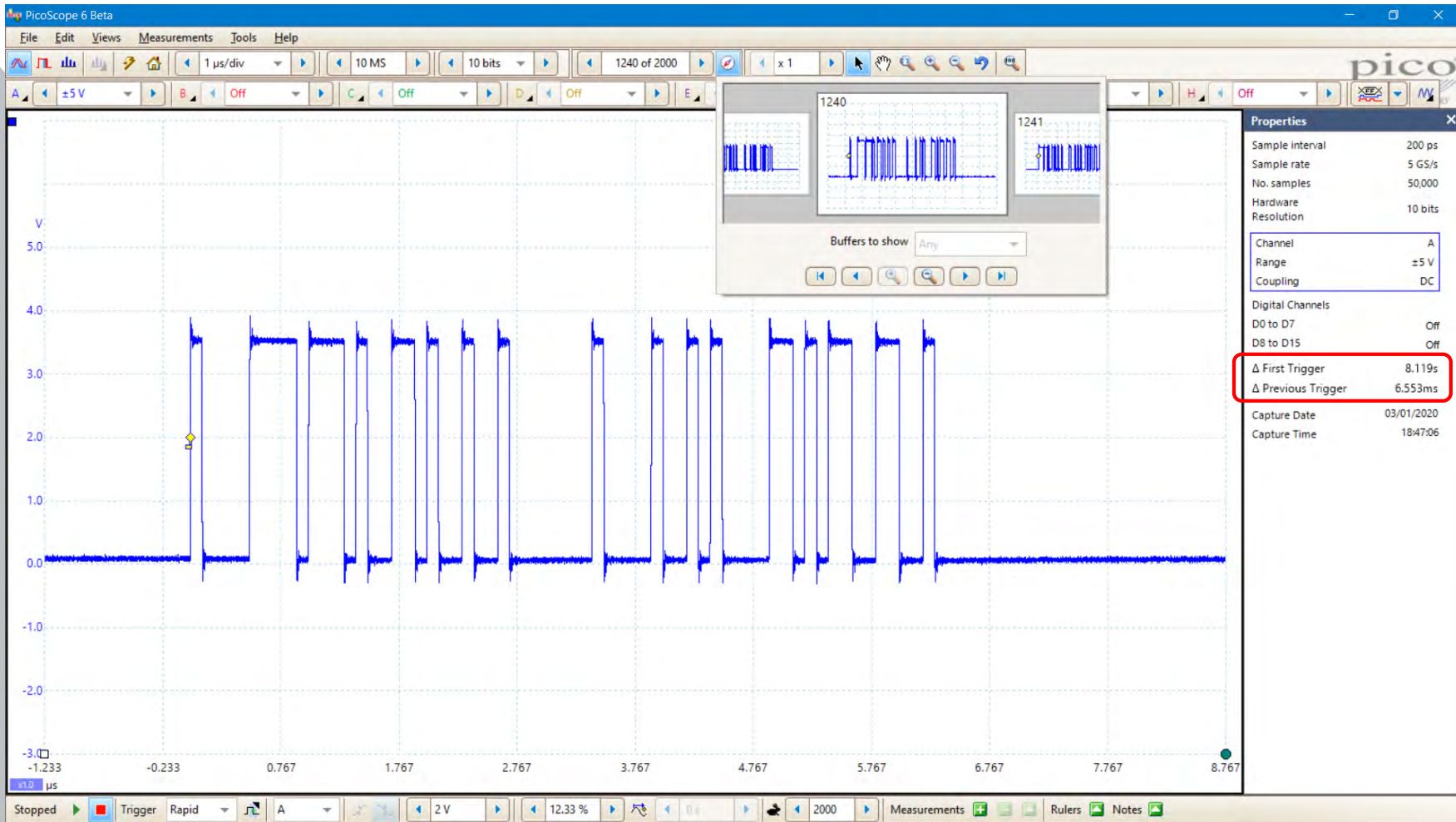
八通道:

250 MS @ 1.25 GS/s = **200 ms**

- (400 ms with API)



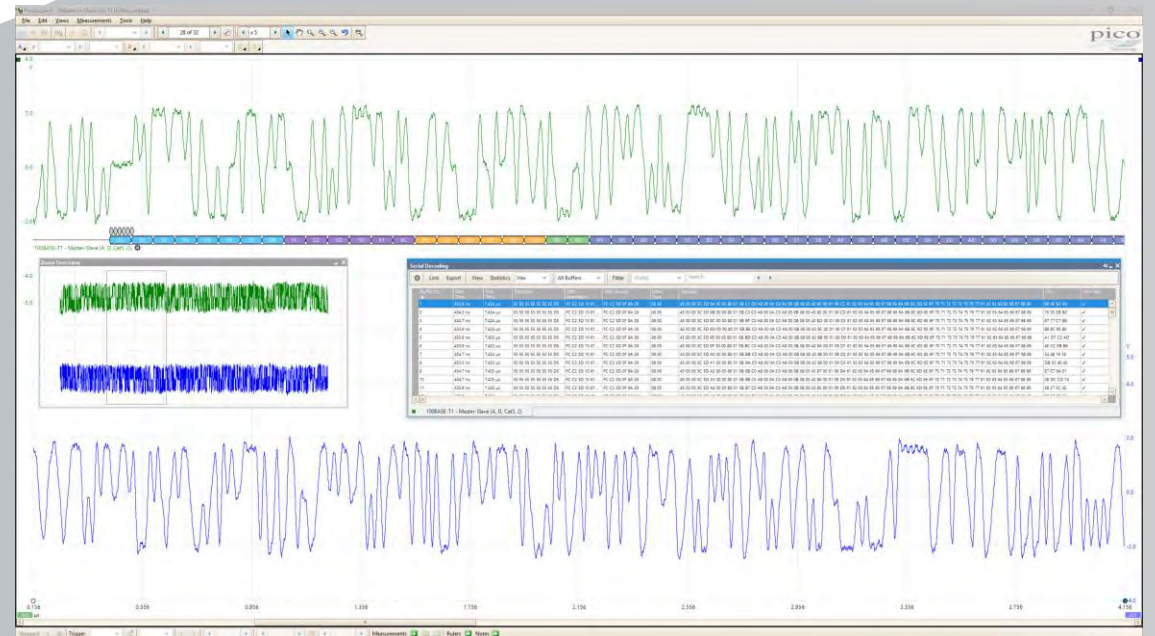
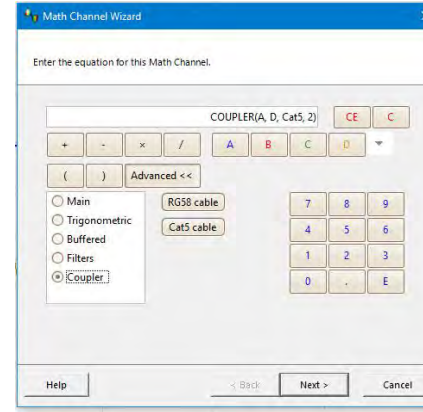
触发时间戳



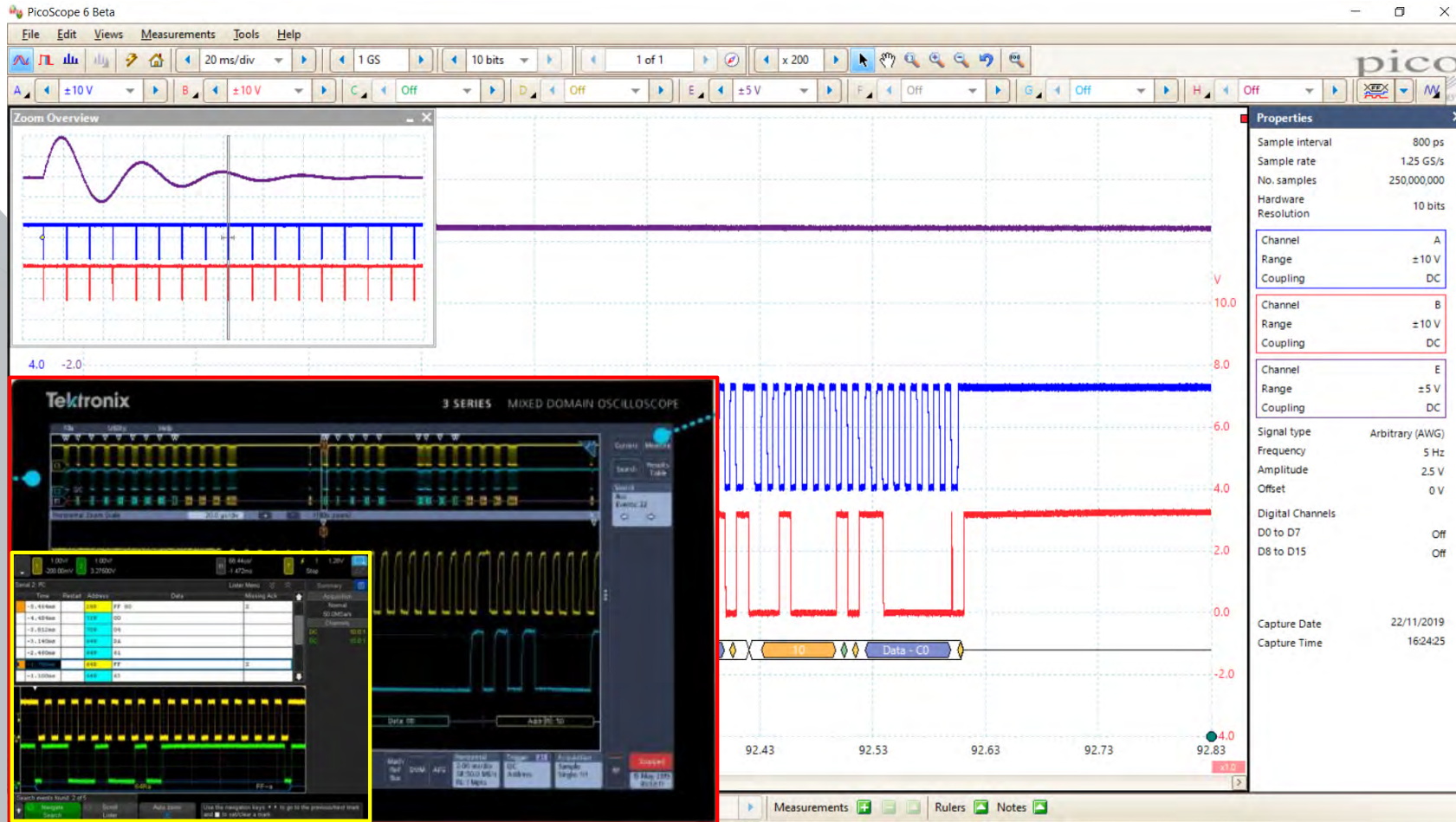
BroadR-Reach 解码

100BASE-T1 汽车总线

- PAM-3 Software Directional Coupler – View full duplex traffic in both directions
- Decode Master > Slave and Slave > Master traffic
- In-graph
- In-table listing view
- Filter / Search / Link analysis tools



更清晰的观测



Keysight 4000 X-Series: 800 x 600 SD, 12.1" SD

Tektronix 3 / 4 Series: 1920 x 1080 HD, 11.6" / 13.3" HD

PicoScope: 3840 x 2160 UHD, to 65" 以及更大屏

➢ 8,000,000 像素: 4 倍于竞争者!

➢ 分区显示功能随后更新...

这是Dave...



Dave是一个典型的电子工程师

他在设计一个嵌入式系统，需要用到8通道示波器来数字解码和观测模拟信号

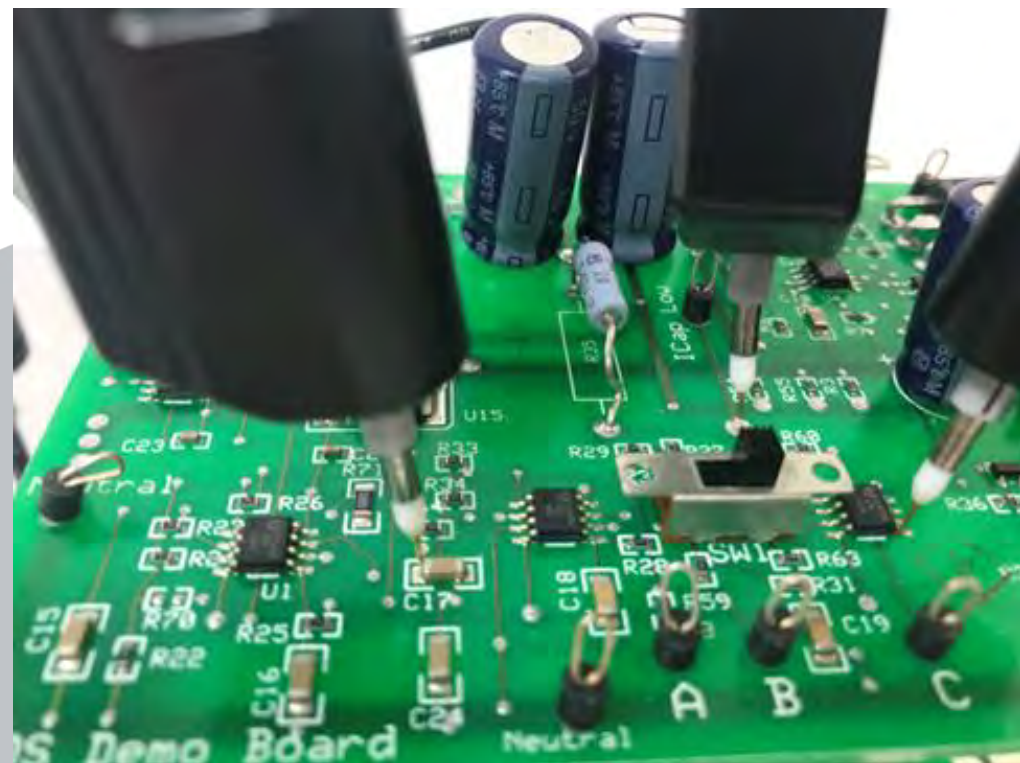
于是Dave 借了一台PicoScope 6824E 8 通道示波器

但是...

Dave 只有两只手!

Pico 探头夹具系统

(为没长8只手的工程师而生!)

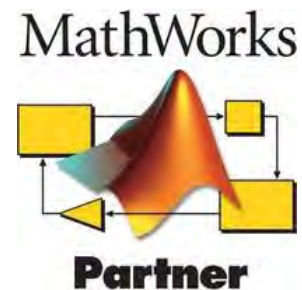


Pico 探头夹具系统和 PicoScope 6000E



- 与Pico 2.5 mm 无源探头完美配合，适用于所有6000型号
- 套件包含：
 - 4 x magnetic PCB posts with insulation washers
 - 4 probe holders
 - Mirror finished steel base plate
 - 8 color coded cable ties (match PicoScope channel colors)
- 套件升级：
 - Adds 4 probe holders and probes!!

PicoScope 6000E 的OEM 应用



The screenshot displays the MATLAB environment for PicoScope. The main editor window shows a script with the following code:

```
107 % display the phase difference
108 PhDiffstr = num2str(PhDiffDeg);
109 disp(['Phase difference Y->X = ' PhDiffstr ' deg'])
110
111 %% Power factor
112 % A on voltage
```

The Command Window shows the execution output:

```
runBlock:- Collecting block of data:
Timebase: 5
Pre-trigger samples: 0
Post-trigger samples: 1000000
runBlock: Waiting for device to become ready...
runBlock: Device ready.

getBlockData: Setting up data buffers...
getBlockData: Retrieving data...
getBlockData: Assigning digital data to port array.
getBlockData: Assigning analog data to array and converting to millivolts.
getBlockData: Data successfully retrieved.
Phase difference Y->X = 8.4113 deg
Power Factor is = 0.98924
THD for Channel A

ans =

-28.7572

THD for Channel B

ans =

-28.7156

Connection to PicoScope 3406DMSO with serial number CQ484/008 closed successfully.
Libraries unloaded successfully.
```

The Workspace window lists various variables and their properties:

Name	Value	Bytes	Class
ans	-28.7156	8	double
archStr	'win64'	10	char
axes1	1x1 Axes	0	matlab.gra...
blockObj	1x1 icblock	14	icblock
chA	1000000x1 double	8000000	double
chB	1000000x1 double	8000000	double
figure1	1x1 Figure	0	matlab.ui...
harmfreq	51x1 double	408	double
harmfreq2	51x1 double	408	double
harpow	51x1 double	408	double
harpow2	51x1 double	408	double
maxSamples	268435328	4	int32
normharpow	51x1 double	408	double
normharpow2	51x1 double	408	double
numSamples	1000000	4	uint32
overflow	0	2	int16
PhDiff	0.1468	8	double
PhDiffDeg	8.4113	8	double
PhDiffstr	'8.4113'	12	char
PowerFactor	0.9892	8	double
Preal	5.0263e+05	8	double
ps3000aConfigInfo	1x1 struct	5384	struct
ps3000aDeviceObj	1x1 icdevice	36	icdevice
ps3000aDigitalObj	1x1 icdigital	14	icdigital
ps3000aEnumInfo	1x1 struct	32936	struct
ps3000aMethodInfo	1x1 struct	93258	struct
ps3000aStructs	1x1 struct	12792	struct
ps3000aThunkLibName	'\picotech.co.uk\...	282	char
ps3000aWrapEnumInfo	1x1 struct	544	struct
ps3000aWrapMethodInfo	1x1 struct	26308	struct
ps3000aWrapStructs	1x1 struct	3768	struct
ps3000aWrapThunkLibName	'\picotech.co.uk\...	290	char
r	-28.7572	8	double
r2	-28.7156	8	double
rmsA	710.1493	8	double
rmsV	717.2869	8	double
samplerate	41666668	4	single
sigGenGroupObj	1x1 icgenerator	14	icgenerator...
status	1x1 struct	1840	struct
timebase	5	8	double
timeIntervalNanoSeconds	24	4	single
timeMs	1x1000000 double	8000000	double
timeNs	1x1000000 double	8000000	double
triggerObj	1x1 ictrigger	14	ictrigger

PicoScope 6000E 系列

型号和价格(Band “B”)

- 6804E 500 MHz, 8通道, 2 GS, 8-bit 垂直分辨率,
- 6824E 500 MHz, 8通道, 4 GS, 8/10/12 bit可调分辨率
(2个型号均包含 4 x P2056 无源10倍探头)
- TA369 MSO 扩展线, 8通道

\$11,395 / €9,675 / £7,995

\$14,245 / €12,095 / £9,995

\$709 / €599 / £499

探头和探头支架套件

	Description	MSRP USD	MSRP EURO	MSRP GBP
TA436	P2036 300 MHz 10:1 passive probe single pack	\$185	€159.00	£129.00
TA437	P2056 500 MHz 10:1 passive probe single pack	\$215	€185.00	£149.00
TA479	P2036 300 MHz 10:1 passive probe dual pack	\$289	€245.00	£199.00
TA480	P2056 500 MHz 10:1 passive probe dual pack	\$359	€309.00	£249.00
PQ215	Pico base probe holder kit (probes not included)	\$379	€319.00	£259.00
PQ216	Pico probe holder kit with 4 x P2036 300 MHz probes	\$639	€549.00	£449.00
PQ217	Pico probe holder kit with 4 x P2056 500 MHz probes	\$709	€609.00	£499.00
PQ218	4 probe holders, no probes	\$245	€209.00	£175.00
PQ219	PicoScope 6800 8 channel probe holder upgrade kit	\$1,285	€1,095.00	£899.00

标准MSO配置：

- 6824E 带4个探头
- MSO 扩展线 x2
- 差分探头 x2
- [包含4GS内存, 任意波发生器, 串行解码等]

\$18,073 / €15,343 / £12,671

潜在客户都有谁？

嵌入式系统设计工程师

工业驱动控制系统工程师

电源系统工程师：功率变换器，IGBT及类似装置

高能物理研究 (CERN, GSI/FAIR, Lawrence Livermore, Rutherford Labs . . .)

半导体设计

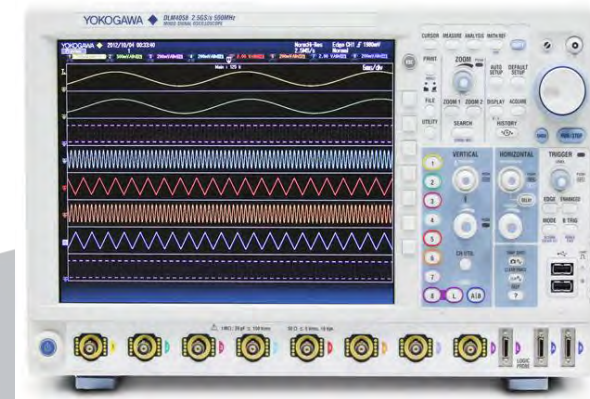
汽车电子设计

机电一体化应用

OEM 开发

竞争者

横河 DLM4000



Performance point	Model	Base Price	MSO increment (16 additional channels)
350 MHz, 8-channels	DLM4038	£13,250	£1,800
500 MHz, 8-channels	DLM4058	£16,000	£1,800

Extras	Option	Price
Digital channels (16)	/L16	£1,800
25 MS memory	/M1	£1,700
62.5 MS memory	/M2	£2,385
125 MS memory	/M3	£3,550
Advanced maths	/G2	£560
Power analysis	/G3	£560
Serial analysis: UART	/F1	£585
Serial analysis: SPI & I2C	/F2	£795
Serial analysis: UART, SPI & I2C	/F3	£1,240
Serial analysis: FlexRay	/F4	£2,650
Serial analysis: SENT	/F9	£1,590
Serial analysis: PSI5	/F10	£1,590

Best in Class Deep Memory & Architecture

Long waveform memory Up to 250 MPoints
 The two advantages of a long waveform memory are the abilities to capture for long periods of time and to maintain high sample rates. Thus achieving higher effective measuring bandwidths for all time base settings.

Measuring time = Memory length / Sample rate

With the maximum memory installed (/M3 option), in single shot mode, a 10 kHz signal lasting for more than one hour can be captured. The same memory can capture a 200 millisecond signal at a sampling rate of 1.25 GS/s.

Relationship between measuring time and sample rate in 250 Mpoint

Sample rate	Maximum measuring time
1.25 GS/s	0.2 s
125 MS/s	2 s
12.5 MS/s	20 s
1.25 MS/s	200 s
125 KS/s	2000 s
62.5 KS/s	5000 s

Caution is needed when using an oscilloscope that does not have enough memory, which can cause lack of sample rate and will possibly fail to capture waveforms accurately.

6824E: 200 milliseconds @ 5 GS/s
 (As standard!)

竞争者: 力科 HDO8050A



- 8 模拟通道
- 16 数字通道
- 350 / **500** / 1000 MHz 带宽
- 12-bit垂直分辨率 (15 bit 软件增强)
- 10 GS/s 采样率
- 50 to 250 MB / 通道内存
- 12" HD 显示

基本价格:

- 8通道 500 MHz \$ TBD
- 标配 \$ TBD

竞争者: Tektronix 5 系列



- 4 / 6 / 8 柔性模拟通道架构
- 高达64 数字通道
- 200 / 350 / **500** / 1000 / 1500 MHz 带宽
- 12-bit 垂直分辨率 (16 bit 软件增强)
- 6.25 GS/s 采样率 (所有通道)
- 128 MB / 通道内存
- 15" HD 触屏显示

基本价格

- 8通道 500 MHz £23,700 / €27,400
 - 62 MB 选件
 - 18 种串行解码, 选件, ~\$2K / 一个
 - 信号发生器, 选件, ~\$2K
 - 频谱分析, 选件 \$2K
- 标配价格 €35,000

PicoScope 6000E 发布计划

January							February							March						
Su	M	Tu	W	Th	F	Sa	Su	M	Tu	W	Th	F	Sa	Su	M	Tu	W	Th	F	Sa
			1	2	3	4							1	1	2	3	4	5	6	7
5	6	7	8	9	10	11	2	3	4	5	6	7	8	8	9	10	11	12	13	14
12	13	14	15	16	17	18	9	10	11	12	13	14	15	15	16	17	18	19	20	21
19	20	21	22	23	24	25	16	17	18	19	20	21	22	22	23	24	25	26	27	28
26	27	28	29	30	31		23	24	25	26	27	28	29	29	30	31				

预发布: 2020年1月24日

正式发布: **2020年2月24日**

价格等级: **Band B**

样机: 订单开放 15th January 2020 (**40% 样机折扣 , 6824E 及附件.**)

发货:

- 样机: 2020年2月份
- 初始库存 / 最终客户订单: 2020年3月份

问题?

