Tektronix

Small Geometry Probes for Surface-Mounted Devices

P6561A – 10X, 200 MHz

P6562A – 10X, 350 MHz

P6563A – 20X, 500 MHz

SMD Package Support:

- **50 mil SOIC & QUAD**
- **25 mil JEDEC**
- **0.5 mm EIAJ**
- **0.65 mm EIAJ**

Scope Compatibility:

- **TDS Series**
- **TAS Series**
- **2400 Series**
- **11000 Series**

Device Loading:

- **Low Capacitance**
- **High Resistance**

Circuit Compatibility:

- **CMOS**
- **BiCMOS**
- **FastCMOS**
- **TTL**
- **ECL**

Ask an electrical engineer to list the typical characteristics of his circuit designs and he will probably respond, "Mostly digital, using some type of CMOS circuitry in a surface-mounted package."

While instrumentation improvements have provided a steady stream of digital troubleshooting tools, the physical challenges associated with probing small geometry ICs have gone unaddressed until now. SMD probes from Tektronix provide circuit designers the first complete, off-the-shelf solution for probing small geometry IC packages with lead spacing approaching 19-mils.

Unique Utility

The Tektronix SMD probe family complements the work style of today's digital designers. Scaled to be compatible with current surface-mounted IC packages, the low-mass SMD probes feature a body only 1.5 inches long and 100 mils wide. A spaghetti-thin, Kevlar® reinforced, coaxial cable delivers the signal from test point to scope with remarkable fidelity.

The probe's basic contact is a 25-mil socket that accepts square or round pins. A variety of tip adapters permit convenient, non-destructive, temporary connection to the most popular EIAJ and JEDEC surface-mount packages.

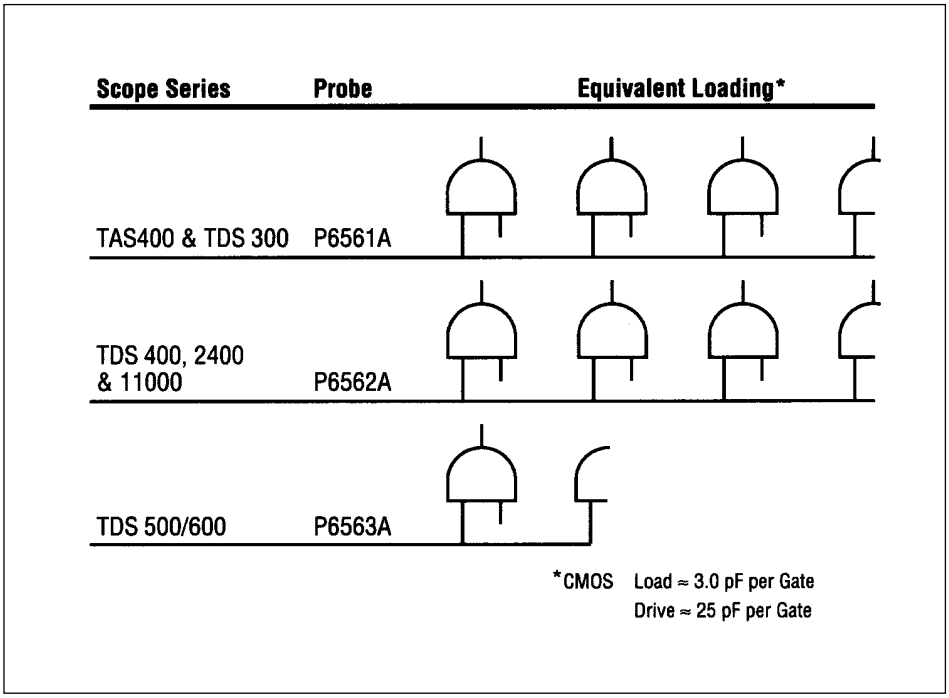


Figure 1. SMD probe family's capacitive loading in equivalent CMOS gates.

Exceptional Performance

Each SMD probe is designed to minimize capacitive loading on TTL, ECL, CMOS, FastCMOS, and BiCMOS circuits. A miniature low-capacitance RC hybrid is encapsulated into the compact SMD probe head. The probe and oscilloscope form a compensated network. This improves measurement system performance in areas of concern to digital circuit designers:

- Fast transient response
- High system bandwidth
- Low capacitive loading

Tight geometrical control of the probe minimizes the parasitic capacitance and allows probe-to-probe time delays of less than 300 picoseconds on models compatible with 200 Megahertz oscilloscopes. On higher performance probes, deltas are held to less than 200 picoseconds. Multichannel timing relationships are easier to acquire and more accurately displayed when SMD probes are used with the appropriate Tektronix oscilloscope.

Equivalent Probe Loading in a CMOS Circuit

The drive capability of an IC technology is a design factor that is often overlooked when troubleshooting a circuit with an oscilloscope. Probe loading can adversely affect the circuit-under-test to the point where it fails to operate. More likely, the probe's input capacitance on the circuit under test will cause rise times to be degraded or induce aberrations, such as ringing, in the acquired signal. A simple way to judge a probe's probable effect on the circuit is to convert the probe's capacitive loading specification into gate equivalents for the circuit's IC technology.

Figure 1 presents a sample conversion of the SMD probe family's capacitive circuit loading to an equivalent number of typical CMOS gates. Being aware of the potential effects of probe loading on the circuit under test can eliminate chasing false indicators, reduce test times, and lead to more accurate and repeatable measurements.

Performance was the result. Unlike generic solutions that concentrate on the banner specification and ignore midrange performance, each recommended SMD probe assures full measurement system performance at the probe tip.

The electrical performance and mechanical solution afforded by the SMD probe family combine to eliminate measurement compromises designers have made in the past when probing small geometry devices. Assured accuracy and easy attachment are the advantages of the Tektronix SMD solution.

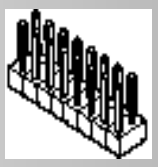
Assured Compatibility and Performance

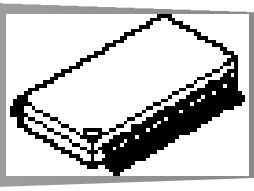
Three probe types are available in the SMD family. The probes are designed specifically to match the system characteristics of either the TDS-, TAS-, 2400-, or 11000-series high-performance oscilloscopes. In each case, the paired performance of the scope/probe measurement solutions achieves accuracy at the probe tip equal to the scope's published specifications.

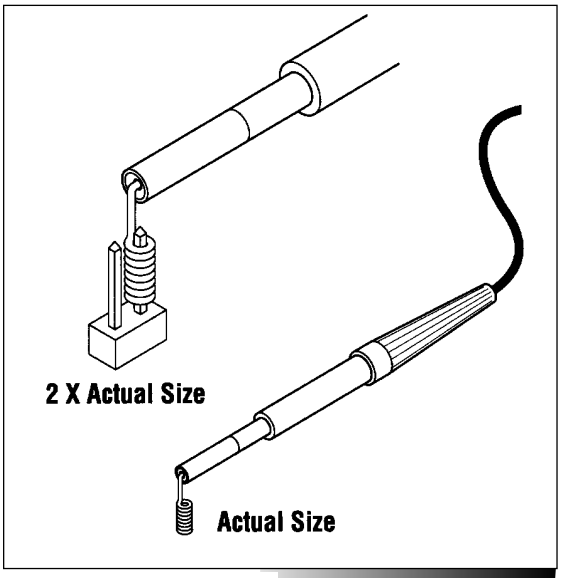
Compatibility started with the design process. The front end of an oscilloscope is a complex multi-poled circuit. By combining the design of the probe with that of the scope, Tektronix engineers integrated the complex response of probe and scope across the specified bandwidth.

GET TO THE POINT!... with Tektronix SMD Probing

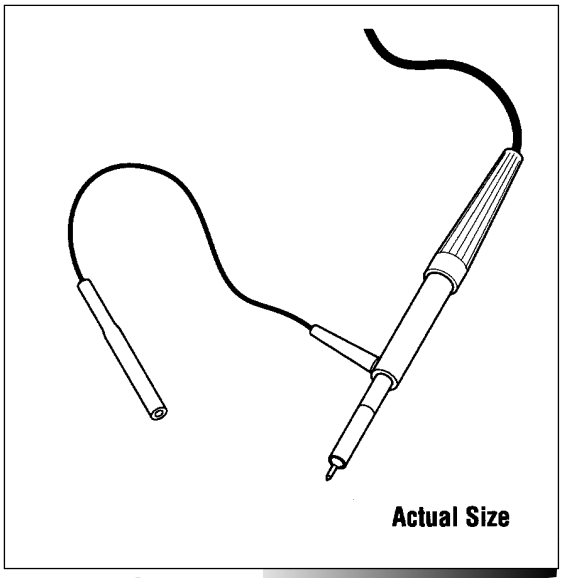
100 mil **50 mil**



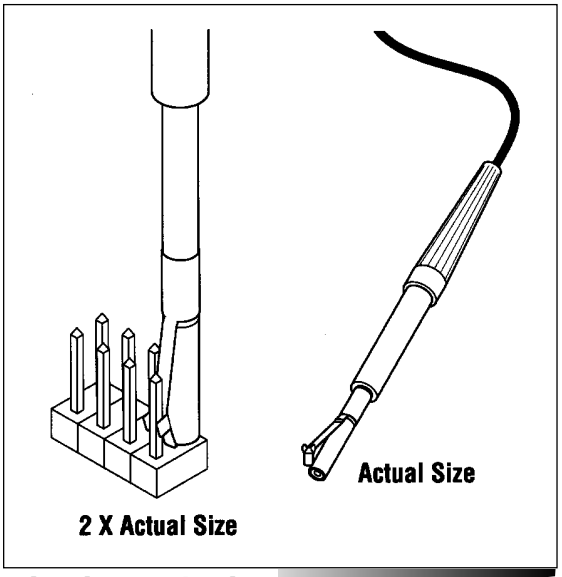




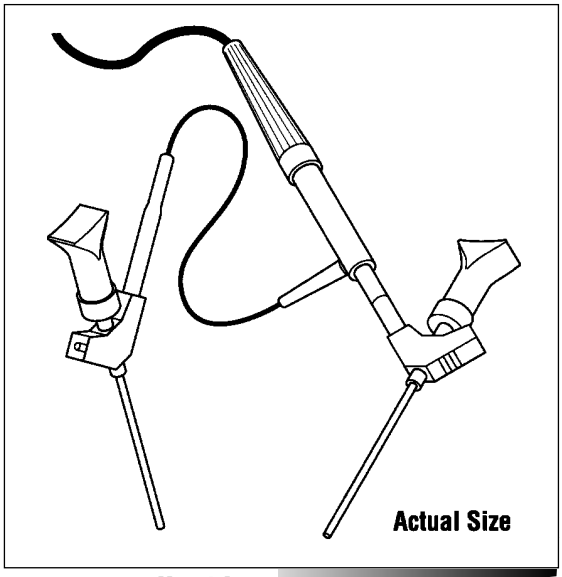
Low-Profile



General Purpose Probe Tip



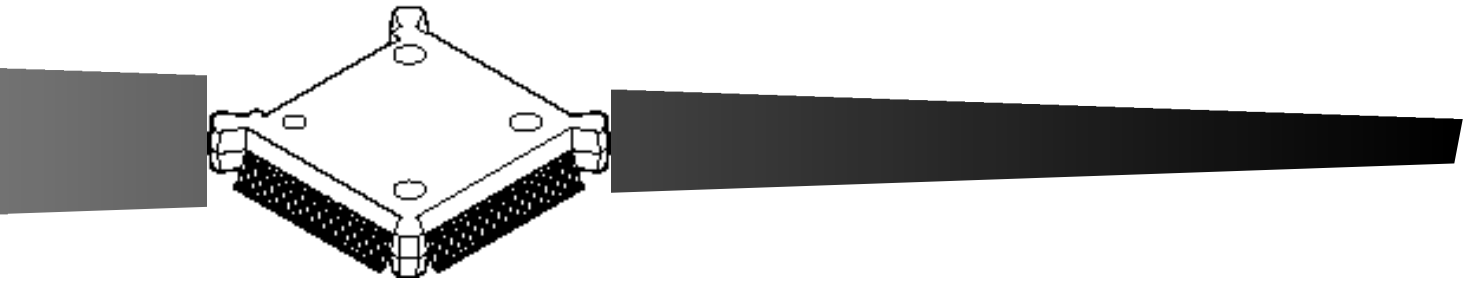
Signal-Ground Pair – Hands-Free Probing

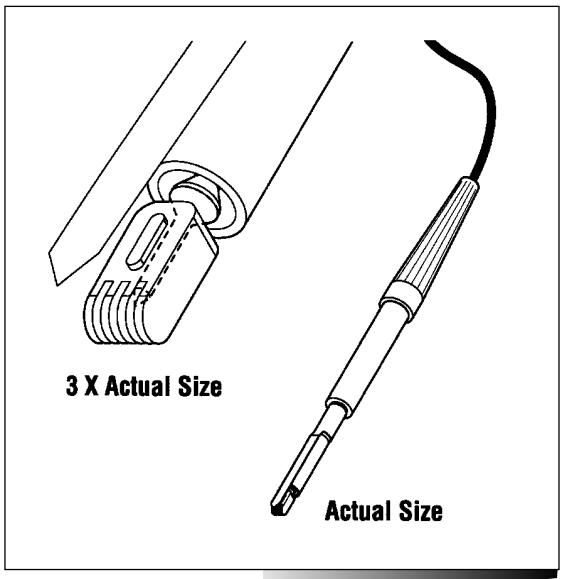


SMD KlipChip – Hands-Free Probing

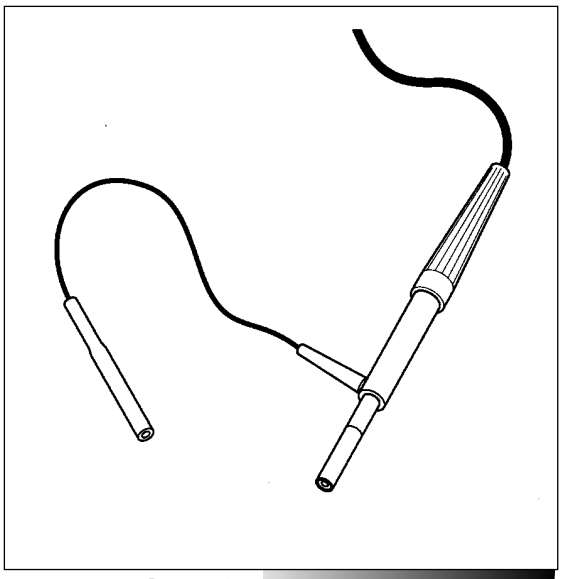
g Solutions for Surface Mounted Devices

25 mil /0.65 mm / 0.5 mm

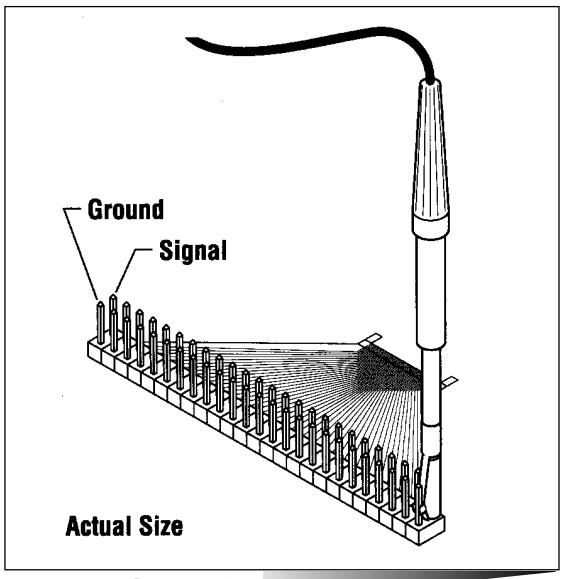




SMD SureFoot
Lead Guide



Basic Probe



FlexLead –
Hands-Free Probing

Mechanical Advantage

Fault-free Connections to Surface-Mounted Devices

- **Interchangeable Probe-tip Adapters**
- **Solutions for Most Package Types**
- **Accepts Any 25-mil Square or Round Pin**

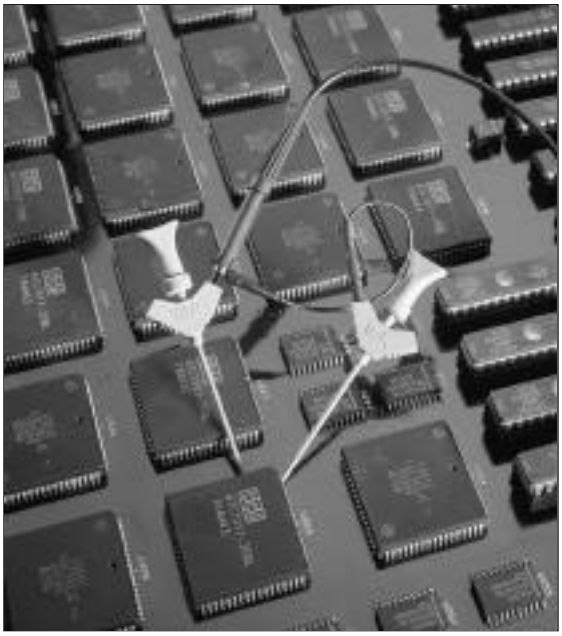
Scaled for Surface-Mounted Devices

- **Low-mass Probe Head**
- **Flexible Cable**

Versatile Probing

Probing SOIC Packages

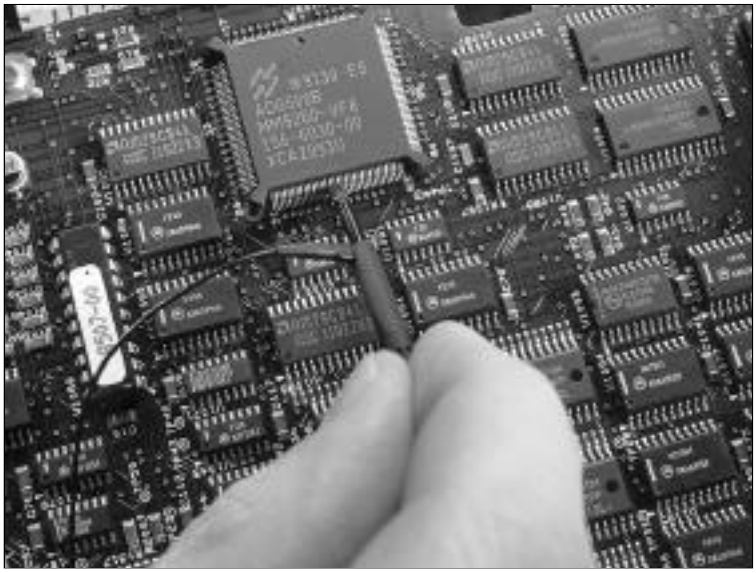
Hands-free probing of popular SMD packages is accomplished without adding long probe leads or placing strain on IC leads. A four-inch, clip-on, ground lead terminates in a 25-mil socket similar to the probe head. Both the ground lead and probe head accept Tektronix SMD KlipChip® adapters which are suitable for grasping SOIC leads on 50-mil centers. Insert the included probe tips to perform hand-held probing on all types of IC packages.



Probing an SOIC using KlipChip adapters.

Small Probes in Tight Spaces

A low-profile, right-angle adapter used with the SMD probes enables direct probing of ICs in the tight space of a card cage or system enclosure. The need for card extenders can be eliminated, and accurate timing measurements taken under true system conditions are now possible. The system effects of temperature, bus loading, and power on the circuit-under-test can now be measured rather than calculated.



SMD probes – light weight with a small body, that's easy to hold.

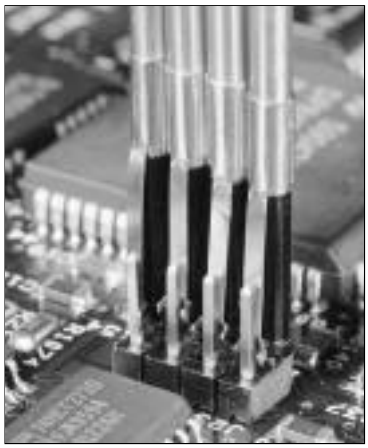
Probing 25-mil, 0.65-mm, and 0.5-mm JEDEC & EIAJ Packages

Tektronix' mechanical engineers solved a big problem with a "small" solution: SureFoot. SureFoot is an integral probe tip and miniature guide that enables fault-free hand-probing of fine-pitch SMD packages. The hard to see IC leads act as guides, aligning SureFoot's miniature plastic tines before the probe tip can contact the device. These tines form a shield between IC leads preventing the probe tip from shorting adjacent pins.

SureFoot probe tips are provided in two versions. The first is compatible with EIAJ (Electronic Industry Association of Japan) standard IC packages having leads spaced on 0.65-mm centers. A second version is compatible with the smaller EIAJ 0.5-mm and JEDEC (Joint Electronic Device Engineering Council) 25-mil packages.

Probes

SMD probes are provided matched to the scope's performance and channel count. Each probe includes the required accessories for hands-free probing.



Probing with signal-ground pairs.

Probing Tip

For improved signal fidelity and probing convenience, a short ground blade is included. To use it, form a ground plane of copper clad on top of the IC to be probed. Attach short jumper wires from device grounds to the copper clad. Then, with the SureFoot probe tip installed, probe the device and display a cleaner signal on the scope.

SMD Probe Characteristics

Electrical

Probe	P6561A	P6562A	P6563A
Oscilloscope Series	TDS 300/TAS400	TDS 400/2400/11000	TDS 500/TDS 600/TDS700
Bandwidth (–3 dB)	200 MHz	350 MHz	500 MHz
Rise Time (typical)	<1.85 nsec	<1.1 nsec	<800 psec
Uniform Signal Delay	±150 psec	±125 psec	±100 psec
Attenuation	10X	10X	20X
Device Loading Capacitance (typical)	<11 pF	<11 pF	<5 pF
Device Loading Resistance	10 MΩ	10 MΩ	9.5 MΩ
Maximum Non-destructive Input Voltage	42 V (DC + peak AC	42 V (DC + peak AC)	42 V (DC + peak AC)
Compensation Range	15 pF to 35 pF	12 pF to 35 pF	7 pF to 30 pF

General Characteristics

Environmental

Temperature –
Operating: 0° C to +50° C.
Non-operating: –55° C to +75° C.

Humidity –
Operating: Up to 90% RH ≤ +50°C.
Non-operating: Up to 90% RH ≤ 60°C.

Physical

Probe Cable Length – <1.3 m (4.27 ft.)
Net Weight – <113 g (4.0 oz).

Warranty

One year covering all labor and parts.

Probe-to-Oscilloscope Selection Chart

Oscilloscope Type	P6561A	P6562A	P6563A
Digitizing	TDS 320 TDS 340	TDS 420A TDS 460A 2430A 2430M 2440 2440M	TDS 520B TDS 540B TDS 620B TDS 640A TDS 644B TDS 680B TDS 684B TDS 724A TDS 744A TDS 784A
Analog	TAS455 TAS465 TAS475 TAS485	2445B 2465B 2467B 2467BHD	
Plug-Ins		11A32 11A34 11A34V	

Ordering Information

P6561A SMD Probe

Includes: Instruction Manual (070-8529-00), Accessory Kit (020-1993-00) – Screwdriver, SMD KlipChip Adapters, Right-Angle Spring Tip, Probe Tips, SureFoot Probe Tips, Short Ground Blade, Signal-Ground Pair Wing, 4-inch Ground Lead.

P6562A SMD Probe

Includes: Instruction Manual (070-8768-00), Accessory Kit (020-1993-00) – Screwdriver, SMD KlipChip Adapters, Right-Angle Spring Tip, Probe Tips, SureFoot Probe Tips, Short Ground Blade, Signal-Ground Pair Wing, 4-inch Ground Lead.

P6563A SMD Probe

Includes: Instruction Manual (070-8769-00), Accessory Kit (020-1993-00) – Screwdriver, SMD KlipChip Adapters, Right-Angle Spring Tip, Probe Tips, SureFoot Probe Tips, Short Ground Blade, Signal-Ground Pair Wing, 4-inch Ground Lead.

For further information, contact Tektronix:

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