

Clearing the air

## The Fluke 87V Digital Multimeter meets chipmaker AMD's need for reliable measurements on mission-critical adjustable speed drives

The term "precise" doesn't fully express the painstaking process control expected on the Sunnyvale, Calif. campus of solid-state manufacturer Advanced Micro Devices, Inc. (AMD).

Technicians in clean rooms, wearing white "bunny suits" and antistatic shoe covers, work at the sub-micron level as they engineer and test AMD's next generation of semiconductor

### Technology at Work

devices. In this demanding environment, the introduction of the tiniest speck of dust could spoil production of the silicon wafers that AMD and its customers depend on.

As a member of the AMD Facilities Electrical team, it's Mark Chellino's job to make sure that does not happen. And now he has a new tool, the Fluke 87V digital multimeter, to help.

Chellino is an electrical plant maintenance specialist for AMD, one of a small number of technicians in the company's Facilities Operations organization who range across AMD's five-square-mile campus as they maintain its complex electrical infrastructure. Among the components Chellino, Chuck Hanlin and others on the team maintain are more than 200 adjustable speed electric motor drives (ASDs) controlling motors from ten to more than 200 horsepower. Most are dedicated to air quality control.

"The air is filtered, and it's also humidity and temperature controlled," Chellino says. "We're plus or minus one degree. We have to maintain our degree of temperature and humidity in the Fab (fabrication plant) to the ISO specs that we have agreed to with our customers in the Fab. If we are unable to maintain that environment, they will have to make adjustments in their process, or discontinue the process until we can reestablish the agreed envelope."

A plant shutdown is clearly not acceptable, so the AMD maintenance team works hard to anticipate and prevent ASD and motor problems.



Mark Chellino uses the 87V DMM to diagnose a control problem.



"Current readings are very important," Chellino says. "Sometimes motors will give you telltale information that they're having a problem between phase to phase, and you can schedule a downtime where you're able to pull the thing without having some sort of disaster."

"A motor failing our air stream, that's a bad thing," he continues. "If it burns up due to a bearing or winding, then it spreads particulates in the air stream, and we could wipe out a few thousand dollars worth of HEPA filters. We need to be accurate, and not let something catastrophic happen."

The electrical team's maintenance requirements include precise measurement of voltage and frequency on AMD's many ASDs. To perform at their peak, drive-controlled motors require the correct volts-to-hertz (V/Hz) ratio to be maintained across their frequency range. Until this year, that posed some problems, even with the array of test tools that Chellino, a Fluke believer for more than two decades, has available.

"Before, we were getting a lot of meter bounce — it was inconsistent," Chellino says. The problem is that the synthetic ac waves created by ASDs include high frequency, high voltage signals. These don't matter to the motor, which responds only to the underlying wave form. But the high frequency noise can confuse most true-rms digital multimeters into giving erroneous readings.

As a result, diagnostic work on VFDs required AMD techs to return to the shop for an oscilloscope. On AMD's sprawling campus, most such trips require driving.

"Of course, that was time consuming. We'd have to go back and retrieve another tool," Chellino says. "It's certainly not as handy as having the 87 with us. That's pretty much what we carry, and having to go back for a scope is inconvenient."

But now, with the arrival of the Fluke 87V, that problem is solved. After using a beta-test version of the meter for several weeks, Chellino is a believer.

"The 87V has a filtering mechanism or circuit that allows us to read a pulse-width, dc-corrected signal. It allows us to read through our mess. We're definitely going to use the 87V over the 87III," he says.

The 87V also uses special shielding to block the high energy noise radiated by ASDs. In other test instruments, this noise can cause erratic behavior.

Chellino is equally enthusiastic about the other new features of the 87V/E Industrial Kit: its integrated temperature measurement capability, bigger display, and its magnetic hanging strap.

"When I go out and troubleshoot, if something's tripping or something like that, I always want to get a temperature reading to see if we've got an ambient heat issue that's contributing or is a symptom of the overload condition. A lot of times, a motor doesn't just give you a readout that says 'here's what's wrong with me.' You've got to look at everything. If something trips, we just don't walk over and reset the breaker or motor control center panel and walk away. We're going to do the diagnosis as completely as possible."

With three technicians covering AMD's huge campus, working alone is commonplace — and that's where TPAK™, the magnetic

hanger now available with the 87V/E Industrial Kit, pays its way.

"That's so fantastic, there's no way to describe it," Chellino says. "It's one of the reasons we bought the Fluke 189."

"Ninety-nine percent of the time we have a single responder to a trouble call, because we're so shorthanded. So that person is first on the line, alone. And having that extra hand, holding that meter in position, is incredible."

Chellino's faith in Fluke tools goes back to 1978, when an experience with a Brand X meter gave him the kind of safety lesson he has never forgotten.

Just making the switch into the electrical maintenance field, he hadn't bought his tools yet, and borrowed a meter from his supervisor. Testing a 277 volt circuit with the meter on a shelf by his face, he touched his probes to the circuit.

"I touched it, and the meter exploded. So after a few expletives . . . pardon my crudeness, but it was quite frightening, though I wasn't hurt."

"I had ordered a Fluke meter as my personal meter. And I told my boss, 'you know what, you don't have to worry about that with this new Fluke.' So my boss says, 'order me a meter like Chellino's getting.' He got one, and then of course everybody else wanted one, and we ended up converting the entire shop."

Today, 26 years later, Chellino still works in a shop equipped with what he calls "an arsenal of Flukes." And the next addition will be the Fluke 87V.

"Having the temperature on board, having the filter on board, plus the reliability of the 87, and all the familiar functions of the 87III on the 87V," he says, "I think it'd be an easy choice, to upgrade or to make a purchase."

"It's everything we need. It's a nice package."

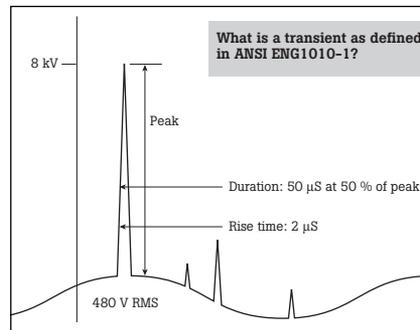
# Attention!

**Working with high-energy circuits?  
Please read this important message.**



277 V/480 V  
347 V/600 V (in Canada)

## What is a transient?



A transient is a short pulse per EN-61010-1 that has a duration of 50  $\mu$ S (at 50 %) with a rise time of 2  $\mu$ S.

**If you ever work with 1000 V CAT III and 600 V CAT IV voltages, be sure to use a Fluke multimeter or instrument with an up-to-date electrical category (CAT) rating that complies with current standards.**

During the past fifteen years, electrical systems have changed. Higher voltages, load switching, larger motors and variable speed drives can result in surges, spikes and transients, that combined with improper procedures or equipment, can cause an arc flash or create other situations that could cause serious injury or death. In response, more stringent safety standards have been written for test equipment.

Examples of hazardous situations in two areas are:

### User error

1. Attempting to measure ohms or continuity on live circuits
2. Attempting to measure voltage with the test leads in the amps position
3. Improper use of test probes on high energy terminals

### Transients or equipment failure caused by:

1. Current interrupt devices opening a circuit
2. Load switching – on/off
3. Motor switching – on/off
4. Motor or system failure
5. Variable speed drives
6. A lightning strike to an electrical system

### Fluke continues to upgrade those of its meters that are designed for higher energy applications

Starting in 1997, Fluke upgraded designs for its high energy-rated industrial meters to exceed the latest standards. These designs included greater electrical creepage and clearance distances between internal components and circuits to reduce the risk of an arc flash resulting from a high voltage transient. The Fluke 87V and 189 DMMs are specified to measure up to 1000 V. They are also unaffected by transients as high as 8000 V. In addition, we designed into our 1000 V CAT III/600 V CAT IV rated meters the following characteristics, all of which exceed industry standards:

- Reduced hazards when a meter is used incorrectly in ohms, continuity or capacitance mode.
- Internal protection to prevent instrument damage when voltage is incorrectly applied to an amp measurement function.
- Internal protection to prevent instrument damage from transients up to 8000 V when applied to the Volts terminals.

- Optional TP38 test probes with only 4 mm of exposed metal probe to reduce user error when connecting to high energy terminals.

Of course, nothing protects a user more than proper safety practices and knowledge about voltage measurement hazards, but Fluke equipment continues to be designed with an eye on the latest safety standards.

For more information, go to [www.fluke.com/safety](http://www.fluke.com/safety)

**Fluke.** *Keeping your world up and running.*

### Fluke Corporation

PO Box 9090, Everett, WA USA 98206

Fluke Europe B.V.  
PO Box 1186, 5602 BD  
Eindhoven, The Netherlands

For more information call:  
In the U.S.A. (800) 443-5853 or  
Fax (425) 446-5116  
In Europe/M-East/Africa (31 40) 2 675 200 or  
Fax (31 40) 2 675 222  
In Canada (800) 36-FLUKE or  
Fax (905) 890-6866  
From other countries +1 (425) 446-5500 or  
Fax +1 (425) 446-5116  
Web access: <http://www.fluke.com>

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