



High-Voltage Integrated Circuit Custom Design and Process Capabilities

HVIC Custom Capabilities

Supertex, Inc. is a supplier of technologically-advanced high-voltage MOS transistors and integrated circuits. The standard devices in our catalogs are found in military, industrial and commercial applications requiring high voltage, high circuit density, low turn-on thresholds, and logic-plus-power on the same chip, known as high voltage integrated circuits (HVIC).

Some of the special applications of our HVICs include drivers for printer heads and plotters, flat panel displays (including plasma and electroluminescent, vacuum fluorescent and liquid crystal displays), medical ultrasound transducers, and bare-board testers. Our special high-voltage manufacturing and design capabilities have been used for many years to provide unique solutions for many customers. The capability summary shown here provides a brief overview of current Supertex custom capabilities to design and manufacture HVICs. These HVICs provide not only proprietary protection for our customers, but also offer them improved performance, lower power dissipation, better reliability, space savings and above all, lower total system cost.

High-Voltage Circuit Design

Supertex provides over twelve years of experience in high voltage integrated circuit design with true complementary N-channel and P-channel output configurations. These may be output devices for push-pull drive, or for fast pull-up or pull-down, providing high density with cost effectiveness. Supertex also offers proprietary low-power level translators for driving high-side drivers with minimal quiescent dissipation.

By design, our logic circuitry is particularly latch-up resistant for increased reliability in noisy environments. This is especially important because many circuits need to perform beyond 20MHz, as in high speed graphic equipment. Where higher speeds are needed, multiple shift registers can be put on a chip for parallel multiplex feeds to conserve power dissipation.

Standard High-Voltage Processes

The foundation for any semiconductor manufacturer is process technology. At Supertex, we have developed and refined a family of high-voltage CMOS/DMOS processes, working closely with our customers for over ten years. They are summarized as follows:

- HVCMOS I: 160V or $\pm 80V$ analog switch with 12V CMOS logic
- HVCMOS II-S1: 80V push-pull, 400V open drain with 5V or 12V CMOS logic
- HVCMOS II-S2: 275V push-pull with 5V or 12V CMOS logic
- HVCMOS III: 200V bilateral analog switch with 5V or 12V CMOS logic

The choice of 5V or 12V is usually dictated by logic interface (5V) or noise-immunity and higher turn-on (12V) requirements. These processes produce truly low power CMOS designs. Our HVICs have low power dissipation that are uniquely suited for low cost high pin count packages.

Custom Product Capability Summary

	Open-Drain Outputs (N-Channel or P-Channel)	Complementary Push-Pull Outputs	Analog Output
Output Breakdown Voltage	30V-400V	30V-275V	30V-160V
Output Current	10 μ A-3A	10 μ A-1A	10 μ A-1A
Number of Outputs	1-160	1-160	1-32
Logic Supply Voltage	5V or 12V		
Package Material	Ceramic or Plastic		
Package Types	J-Lead (PLCC), Gullwing [†] , DIP, or Dice		
Temperature Ranges	0° to 70°C (commercial), -40° to 85°C (industrial), -55° to 125°C (military)		
Technologies	CMOS/DMOS, Analog, Digital, or Mixed Signal		
Frequencies	DC to Video		100kHz

[†]Flat packs with leads on 3 or 4 sides

Packages and Die Options

One of our main strengths is providing the advantages of high-voltage ICs in high pin count packages.

We can provide:

- Standard QFP packages up to 100 leads
- Special packages for more than 84 leads
- J-lead (PLCC), gullwing, or DIP packages
- Small-outline packages
- Custom lead frames and special lead bends
- Hybrids and arrays

These offerings provide space efficiency and reduced insertion costs to our customers. They are particularly appropriate in flat-panel displays and printer assemblies as well as other applications where space is at a premium. All offerings are available in industrial temperature range versions, and most can be supplied as military versions as well.

For the ultimate packaging density, we can supply dice. Using pad pitches down to 100 microns or less, with aspect ratios up to 7 to 1, optimum interface to printers and displays can be achieved. The user thus has several choices: die in wafer pack, in wafer form, or as bumped die for tape automated bonding (TAB); chip-on-glass or die on printed circuit board. All of these offer cost and space savings. However, packaged products provide testability and field repairability as well as the capability of machine (robot) insertion or placement.

Quality Monitoring

The latest statistical methods are used continuously to improve quality levels. Statistical Quality Control (SQC) is an ongoing tightening of such levels in-process.

Our Parts per Million (PPM) program is a continual feedback loop to ensure conformance to the customer's specifications using computerized data generated from each processed lot. Custom parts receive the same benefits from our Quality and Reliability Programs as standard parts. Supertex routinely supplies 883C parts to manufacturers of military equipment.

Reliability SUPERTEX INC

We also have in-house activities to ensure the reliability of our products in the field. These include:

Reliability Monitoring Program - Lot samples are tested and monitored on a periodic basis for infant mortalities and long-term degradation.

Failure Analysis Laboratory - We have our own lab on the premises, with SEM, SRP, LCD thermal, and other analytical equipment. This lab enables us to get fast feedback for corrective action whenever necessary.

Our R & D departments are continually developing improved circuit and processing techniques for raising the electrostatic discharge (ESD) protection on our devices (presently at $\pm 2\text{KV}$). Manufactured parts are put in anti-static coated plastic tubes to protect them in shipment. All assembly facilities are meticulously inspected for adherence to ESD procedures.

Solutions to Design Needs

Supertex has a proven track record in the development and production of custom and semi-custom high voltage integrated circuits. Since its inception in 1976, Supertex has provided custom solutions for computers, military, telecommunications, medical instrumentation, and consumer products. Based on its pioneering HVCMOS® technology, and supported by a staff with uniquely diverse expertise and experience, Supertex provides the research and development environment which provides its customers with the most advanced solutions to custom and semi-custom HVIC requirements. A thorough understanding of customer requirements by our application engineers and circuit designers results in practical and commercially viable solutions. Working closely with its customers, Supertex develops meaningful time lines and specifications for production and provides continuous progress updates to ensure quality solutions on a timely basis.

If your product requires a custom or semi-custom high voltage integrated circuit, Supertex can provide you with the resources necessary to accomplish your goals. Contact your nearest Supertex sales office or the Sunnyvale headquarters directly to begin creating the solution to your custom or semi-custom HVIC requirements.