

# HALO

ELECTRONICS, INC.

**SOLUTIONS THAT KEEP YOU CONNECTED**



## Company Profile

HALO Electronics, Inc. is a privately held company which was founded in 1991. The company was created as a result of the realization that the communications industry desired more from their magnetic component suppliers. Specializing in LAN and WAN magnetics for the communications industry, HALO provides the highest quality, advanced technology leadership, unsurpassed service and competitive prices. HALO strives to meet our customers' expectations by incorporating three key ingredients:

**1. Quality** – Implementation of our ISO-9001 certified Quality System along with our patented SMD construction provides the highest quality solutions to our customers, achieving customer satisfaction through continuous improvement.

**2. Technology** – HALO continues to provide technical leadership to both the LAN and WAN industries by developing "next generation," cost effective and real estate efficient solutions to meet the ever-increasing need for higher port density. Please see HALO "Firsts" for additional information.

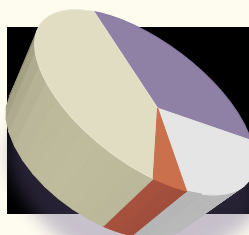
**3. Development Support** – Developing "next generation" technology is only of value if the technical support is available to enable our customers to design with our leading edge products. HALO is committed to providing our customers the R&D support at all levels of their product design to insure a successful design and product release.

The 100,000 sq. ft. manufacturing facility is located in the Guang Dong Province of Mainland China. This facility can support up to 4,000 employees as needed to meet our customers' requirements. Sales offices and warehouses are located in Mountain View, CA, Las Vegas, NV, Hong Kong and Singapore. Manufacturers' Representatives and Distributors are available to meet the needs of our global customers in over 30 countries.

Las Vegas,  
Nevada



Mountain View,  
California



**Asia 40%**  
**North America 30%**  
**Europe 25%**  
**ROW 5%**

Delivering our products on time is an important pledge we have made to our customers. The HALO Management Team is committed to delivering our products on time, every time to all of our valued customers. Our material management and shipping systems are monitored and evaluated for continuous improvements.

As a result of our technology leadership, HALO Electronics is recognized as a premier supplier of magnetic components by leading communication semiconductor manufacturers, such as Broadcom, Dallas Semi (Maxim), Exar, IDT, Infineon, Intel, Marvell and PMC Sierra.

We have proven our quality, reliability and cost effectiveness to major communications customers including Adtran, Cisco, Motorola, Nokia and Siemens to name a few. We welcome the opportunity to prove our strengths as a key communication magnetics supplier to you as well.

**1993** - HALO introduces the TnT™ module. The first, cost effective, 10BASE2 module for real estate sensitive Thin Net and backplane applications.

**1994** - HALO develops a proprietary, patented, SMD transformer technology providing the industry the most robust transformer solutions. Designed to survive today's higher temperature SMD reflow processes.

**1995** - HALO, in conjunction with Maxim Integrated Products, develops the TGM-P3 series of low cost PCMCIA transformers for use with the MAX253/845 series of monolithic oscillator/power drivers for small low cost DC/DC converters.

**1997** - Introduces the Quatra™ series—the first quad port T1/E1 magnetic module. Developed in conjunction with Level One (Intel) to provide the highest density T1/E1 solution for high density applications. Available with or without CMR chokes.

**1998** - HALO creates the Ultra™ series, the most cost effective and real estate efficient 10/100BASE-TX transformer. Today, this SOIC16 package is the industry standard for single port Fast Ethernet applications.



## HALO Product Overview

HALO Electronics, Inc. specializes in communications magnetics for the LAN and Telecom industries. Our hi-density toroidal products have become the standard for the industry.

### LAN Products

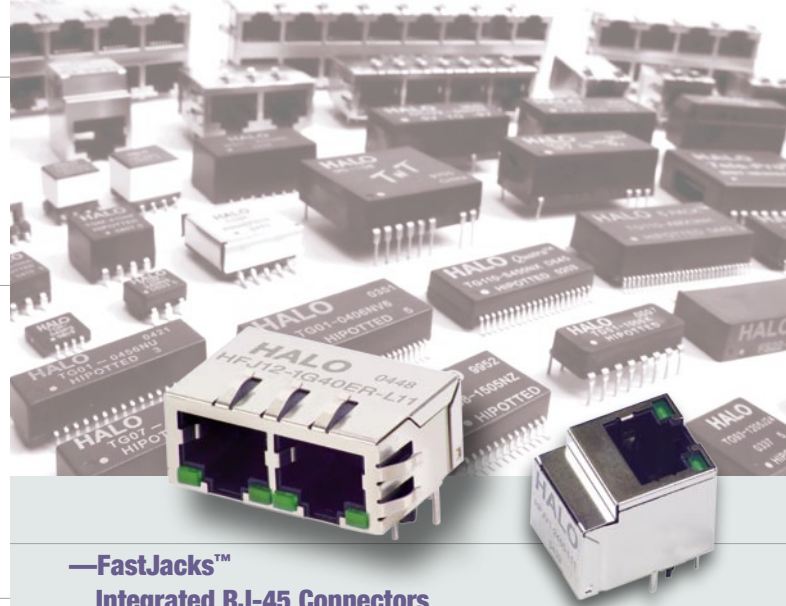
HALO offers a complete family of products to meet the IEEE802.3 requirements for Ethernet. Products support the following applications:

- 10BASE-T
- 10/100BASE-TX
- Gigabit (10/100/1000)
- Power over Ethernet (PoE)
- VoIP

### —LAN Transformers

HALO provides a broad range of Isolation transformers and CMR chokes in hi-density single, dual, quad and six port configurations. Ethernet magnetics are available in Through-hole and SMD packages. Surface mount devices can be ordered in PCMCIA, SOIC and PCI compliant solutions. Filter products are available in DIP and SIP packages.

Our proprietary Backplane transformers are available in single port through 10-port SMD packages as needed to meet our customer's real estate requirements.

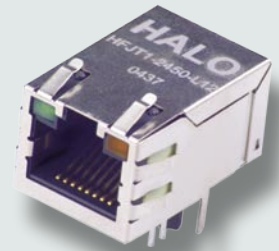


### —FastJacks™ Integrated RJ-45 Connectors

HALO has developed a complete line of integrated RJ-45 connectors for single, ganged or stacked and ganged applications. Single port solutions include Tab Down, Tab up, vertical, as well as low profile for PCI/PMC applications. Options include integrated LEDs.

#### Circuits are available for:

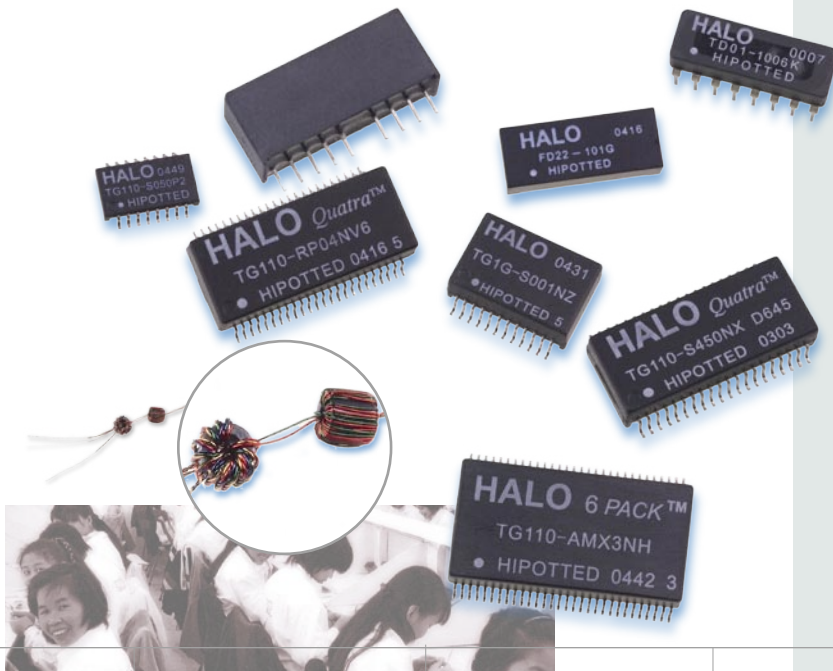
- 10BASE-T
- 10/100BASE-TX including  
—GR1089 compliant
- Power Over Ethernet
- Gigabit



GR1089 compliant devices are available with two "footprint" interchangeable protection circuits providing the customer the lowest cost opportunity.

PD Power Over Ethernet FastJacks™ contain the complete solution for power polarity and location correction, significantly reducing cost and real estate. Recommended by several leading silicon vendors.

Gigabit solutions are available in several drop-in replaceable circuits to address specific EMC issues relating to each unique customer application eliminating the need for costly PCB changes.



**1999** – HALO announces the industry's first series of UL recognized 4.5KV isolation transformers for Ethernet applications requiring a high level of safety.

**1999** – Introduces the industry's smallest dual port T1/E1 transformer series. This new series provides a 40% real estate reduction while significantly reducing cost.

**2000** - HALO develops the Tele-Pro™, a complete dual port, module for T1/E1 applications. The circuit includes isolation, CMC noise reduction, lightning strike and power line cross protection and surge suppression.

**2000** – The 6-Pack™ is another example of HALO's technology leadership. The 6-Pack™ provides six ports of 10/100 magnetics in a single package providing the highest density solution for real estate sensitive applications.

**2001** – HALO Announces the E-Ultra™, the first industrial version of the Ultra™ for applications requiring extended temp range (-40 to +85C) performance.



Telecom Products

HALO Electronics continues to be a leader in the fast changing Telecommunications market. We have been a pioneer in reducing the real estate and cost per port in digital Telecom applications. Our products support T1/E1/J1/Primary rate ISDN and CEPT, E3/DS3 and STS-1, E4/STM-1, Switched 56 and 64 Kbps as well as Basic Rate ISDN and DSL.

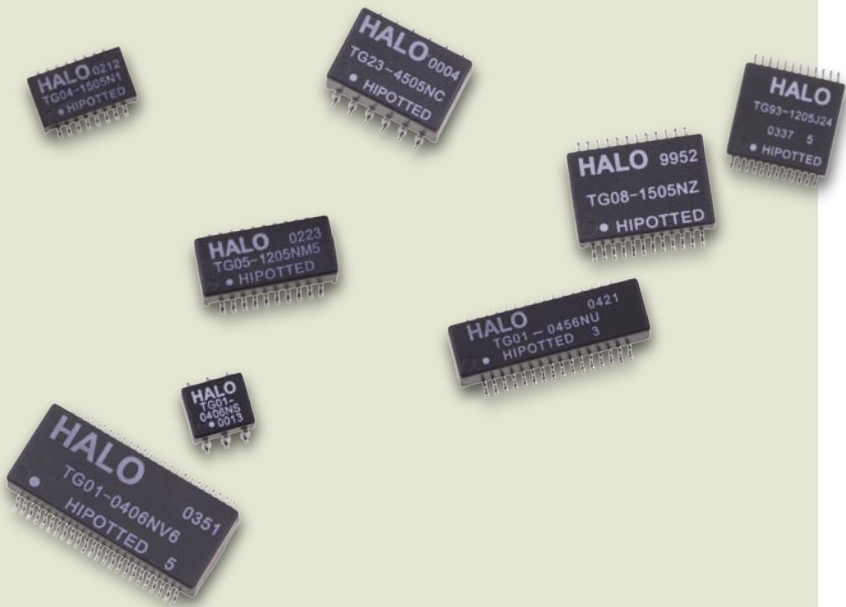
—Telecom Transformers

HALO T1/E1 Isolation transformers are recognized by most leading LIU silicon vendors. These products are available in DIL and SMD packages ranging from single channel up to 6 ports. Optional CMR chokes are available in most families enabling the designer to easily upgrade to a reduced emissions solution.

Supplemental and Reinforced insulation solutions are also available up to 4.5KV isolation to meet the most critical safety requirements.

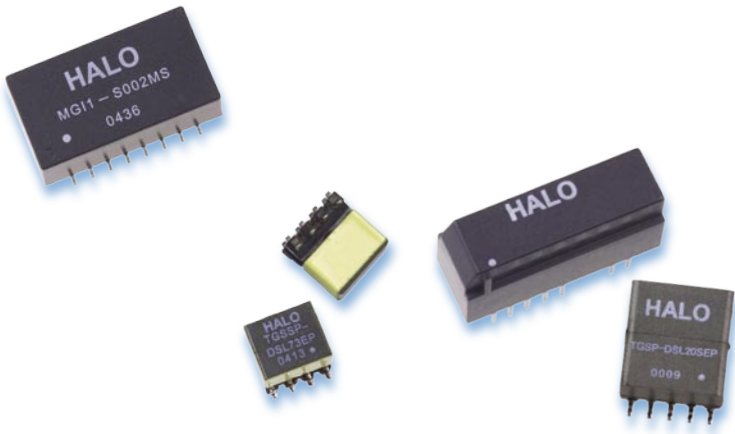
T3/E3 solutions are available in single channel, single port and multi-port packages.

A full line of E4 and STM-1 magnetics have been developed in single channel and single port solutions to support Intel and TDK IC's providing excellent return loss performance.



—ISDN and DSL Solutions

HALO offers a wide assortment of Basic Rate ISDN and DSL solutions to support most popular LIU's. As well, several ISDN modular solutions are available to provide real estate and cost benefits in critical applications.



**2001** - Introduces the industry's first Mini-Octal™ 4-port T1/E1 family providing the next step in miniaturization in Telco applications.

**2001** – HALO is first to announce the dual port Gigabit Ethernet transformer series.

**2001** – HALO expands their leadership position by developing the first Power Over Ethernet Ultra™. This is the industry's smallest and lowest cost IEEE 802.3af compliant PoE solution.

**2002** – HALO announces the industry's most complete line of Power-Over-Ethernet (PoE) multi-port transformers for hi-density switch applications.

**2003** – HALO develops PoE FastJacks™ which provide the complete PD solution greatly reducing component count, real estate and cost.



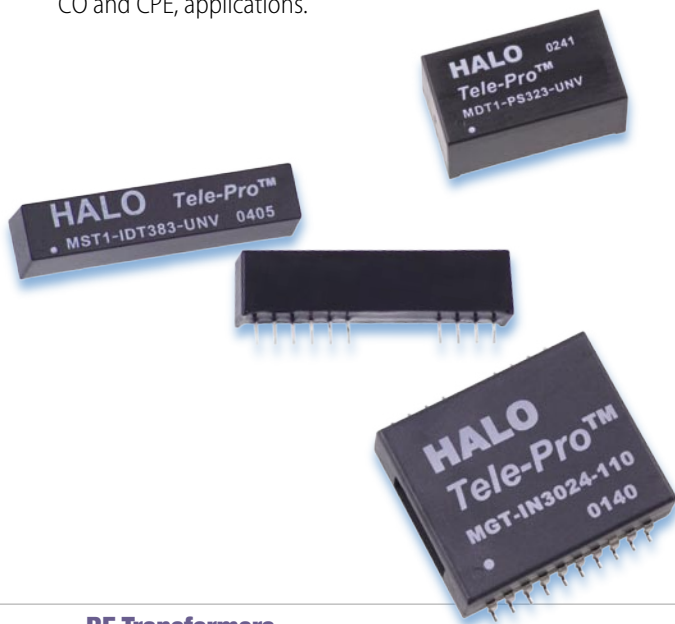
## —Tele-Pro™ Modules

HALO offers a full line of modular T1/E1 solutions. This series provides the complete protection circuitry for isolation, noise reduction, lightning strike and power line cross.



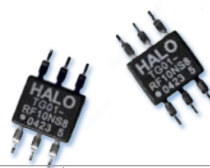
The Tele-Pro™ series is available in single port DIL or SIP modules as well as dual port DIL and SMD packages. Modules are available for most popular LIU's.

The Tele-Pro™ series is UL and EN60950 recognized and meets the requirements of GR1089 for both Intra-building and Inter-building, CO and CPE, applications.



## —RF Transformers

HALO offers a complete selection of RF transformers in 6 pin DIL and SMD packages. Available in frequency ranges up to 500MHz.

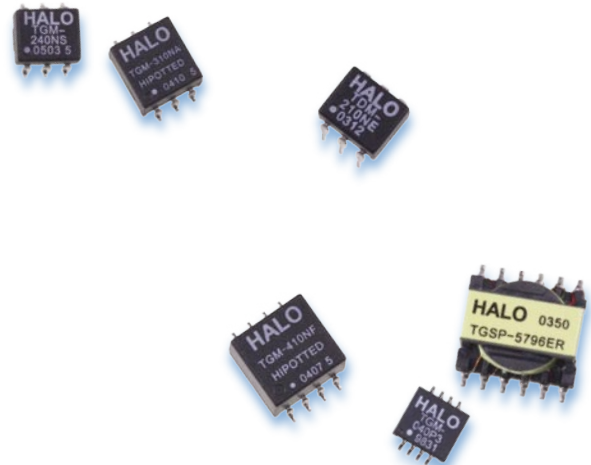


Zhong Shan City,  
China



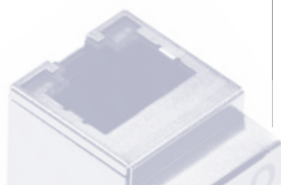
## Power Products

HALO also offers a full line of power transformers for isolated DC/DC converter applications. These transformer solutions range from 750mW for low power instrumentation and medical applications, up to 15 watts for PoE powered devices.



**2003-** HALO introduces a complete line of Ethernet over the back-plane transformers.

**2004 –** HALO announces the industry's first Vertical Integrated RJ45 connector. Available in 10BASE-T, 10/100 and Gigabit.



**2004 -** HALO, in conjunction with ERNI Electronics, develops the industry's most robust contact design for the FastJack™ series of integrated RJ45 connectors meeting the most stringent reliability requirements.

**2004 –** HALO announces the industry's first low cost SIP Tele-Pro™ module providing a complete Inter-building protection scheme along with the transformers and CMR chokes.

**2005 –** HALO develops the industry's first low profile integrated RJ-45 connector for PCI applications. Available in 10BASE-T, 10/100 and Gigabit solutions.



## Capabilities

- **ISO-9001 Certified**
- **UL60950 recognized**
- **EN60950 recognized**

High volume, accurate winding of toroidal and bobbin style transformers and CMR chokes.

PCB Assembly utilizing “state of the art” pick and place and SMD reflow equipment for modular products.

Experienced design teams with expertise in all digital communications and low power magnetics:

- Standard and custom designed toroidal transformers utilizing our robust patented SMD construction technique.
- Bobbin wound transformers including EE, EP, EFD, and RM cores for low power DC/DC converters and DSL applications.

A close working relationship with most key silicon manufacturers enabling complete transformer compatibility and compliance testing.

Excellent technical support including:

- Application Assistance
- Quick turn sample delivery
- Fast transition time from Engineering to Manufacturing

## Quality

Quality is designed into every part during concept development and prototyping.

As well, quality is built into each part, utilizing our proprietary manufacturing techniques and patented construction.

100% final testing of all critical parameters is performed on “state of the art” high speed automated test systems developed by our Test Engineering Department.

Power module products are burned in at elevated temperatures increasing the reliability confidence of the IC’s and overall power circuit.

## Continuous Quality Improvement

HALO is committed to the concept of reducing costs by improving yields. Key areas that are part of our continuous improvement program include:

- Vendor Quality Process Analysis
- Qualification Testing
- Statistical Process Control
- Training
- On-Going Life Testing
- Characterization of Products

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