

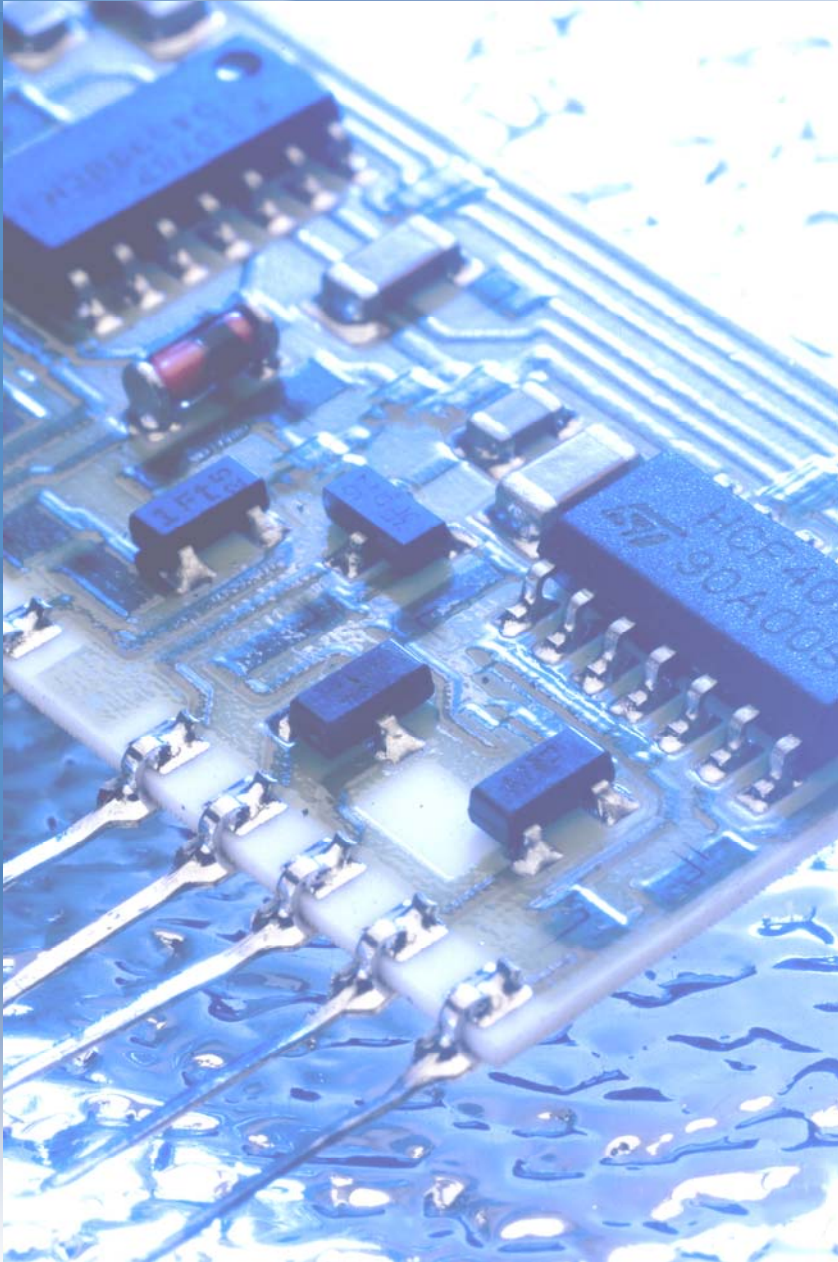
# ***TeleControlli srl***

***HYBRID CIRCUITS  
&  
MICROELECTRONICS***

[www.telecontrolli.com](http://www.telecontrolli.com)



Telecontrolli



## **COMPANY PROFILE**

**TELECONTROLLI IS A PRIVATE AND INDEPENDENT COMPANY.**

**FIELDS OF ACTION : INTERCONNECTION TECHNOLOGIES, APPLICATIONS AND SERVICES.**

**OUR GUIDELINES : INNOVATION, QUALITY AND ENVIRONMENT COMPATIBILITY.**

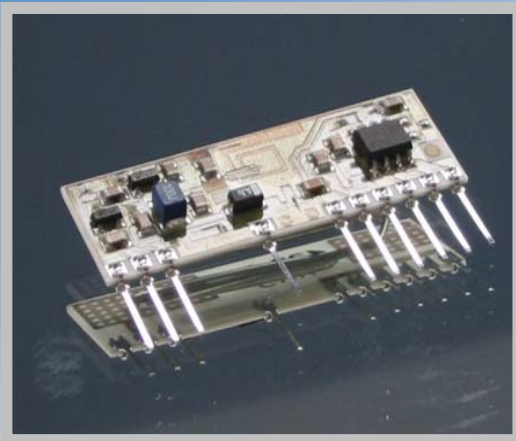
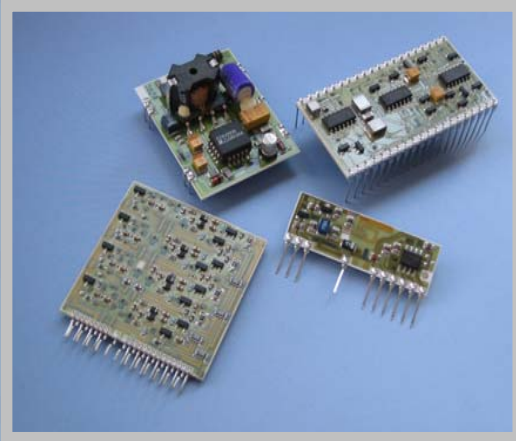
**TELECONTROLLI IS AN EUROPEAN COMPANY : WE ARE BASED IN NAPLES, ITALY.**

**60% OF TELECONTROLLI TURNOVER IS EXPORT : U.K., SPAIN, GERMANY, U.S.A., BRASIL, FRANCE, POLAND ARE OUR PRINCIPAL MARKETS.**

# MAIN PRODUCTS

## **THICK FILM INTERCONNECTION TECHNOLOGIES & VALUE ADDED MODULES**

TELECONTROLLI DESIGN, PRODUCES AND SELLS FOR THE WORLDWIDE ELECTRONIC MARKETS:



- **HYBRIDS INTEGRATED CIRCUITS**
- **FUNCTIONAL MODULES**
- **WIRELESS LOW POWER MODULES**
- **CUSTOM PRODUCTS ON CERAMIC SUBSTRATUM**
- **DC/DC CONVERTERS**
- **POWER MODULES**
- **MUSICAL INSTRUMENTS MODULES**
- **LOW CONSUMPTION SENSORS**

## **HIGHLIGHTS**

**THE COMPANY SINCE 1982** A MEMBER OF A TELECOMMUNICATION GROUP LEADER IN INTERNATIONAL PUBLIC TELEPHONE FIELD.

**TELECONTROLLI PLANT IS LOCATED IN NAPLES**, IN SOUTH OF ITALY, ON A COVERED AREA OF 4300 m<sup>2</sup>, INCLUDING 450 m<sup>2</sup> CLEAN ROOM.

**THE COMPANY TODAY EMPLOYS OVER 80 PEOPLE**, HIGHLY SPECIALIZED IN THICK FILM HYBRID TECHNOLOGY: 50% TECHNICAL, DESIGN, MARKETING, SALES, ADMINISTRATION STAFF; 50% SKILLED PRODUCTION OPERATORS.

**TELECONTROLLI SALES NETWORK** SELLS DIRECTLY IN DOMESTIC MARKET AND HAS A STRONG DISTRIBUTION WHICH PROVIDES SUPPORT TO MOST MARKETS WORLDWIDE.

**THE COMPANY HAS PARTNERS** IN ALMOST EVERY EUROPEAN COUNTRY, SOUTH AFRICA, CANADA, UNITED STATES, BRAZIL, JAPAN, TAIWAN, AUSTRALIA

# **CUSTOM HYBRIDS FOR:**

## **HIGH RELIABILITY APPLICATIONS**

### **AEROSPACE & MILITARY:**

COMMAND CONTROLS, PRECISION DEVICES, NAVIGATION INSTRUMENTS, SAFETY SYSTEMS, DATA COMMUNICATIONS...

### **MEDICAL EQUIPMENTS:**

MODULES FOR CARDIOGRAPHIC SYSTEMS, ECHOGRAPHIC DEVICES, PACE MAKERS, DIAGNOSIS AND ANALYSIS EQUIPMENT...

### **SCIENCES INSTRUMENTS:**

PHYSICS AND NUCLEAR RESEARCH, CHEMICAL TEST, ENVIRONMENT MONITORING...



## **HARD ENVIRONMENT EQUIPMENT / INDUSTRIAL PRODUCTION**

### **AUTOMOTIVE, RAILWAYS, AVIONIC, NAUTICAL**

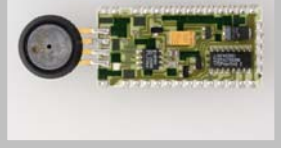
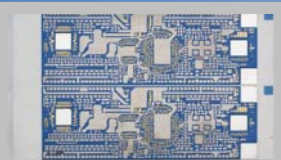
ELECTRONIC IGNITIONS, E.C.U., LIGHTS, POWER SUPPLY, SENSORS...

### **POWER DEVICES & INDUSTRIAL AUTOMATION**

POWER SUPPLY, MOTOR DRIVERS, INVERTERS, DC/DC AND AC/DC CONVERTERS, PWM CONTROLLERS, CURRENT AND VOLTAGE REGULATORS, HIGH POWER LED MOUNTING, RELAY DRIVERS, ENCODER AMPLIFIERS, SAFETY SYSTEMS...

### **SENSORS**

PROXIMITY SWITCH INTERFACES, PRESSURE TRANSDUCERS, CAPACITIVE SENSORS...

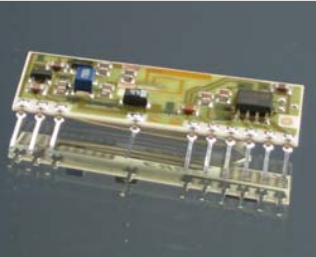


# **STANDARD HYBRIDS FOR:**



## ***HOME & BUILDING AUTOMATION***

REMOTE CONTROLS FOR GATE/DOOR, TEMPERATURE REGULATION & CLIMA, EMERGENCY LIGHTING CONTROL, RAIN SENSORS, TOUCH SENSORS...



## ***SECURITY AND SAFETY SYSTEMS***

LPD RF TRANSMITTERS AND RECEIVERS, ULTRASONIC DETECTORS, INFRA RED DETECTORS, FIRE AND SPARKS DETECTION...



## ***DC / DC CONVERTERS***

MODULES FOR POWER SUPPLY, VOLTAGE REGULATORS, TELECOM MAINBOARD...

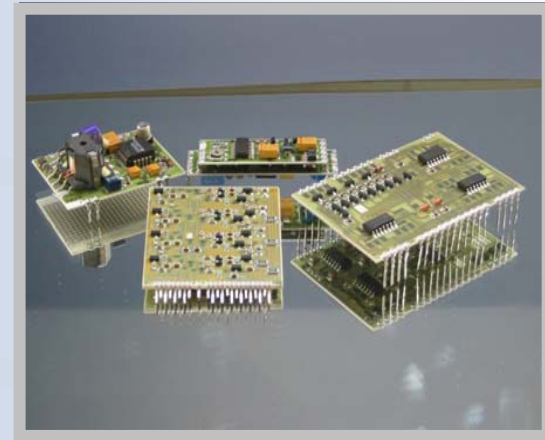


## ***MUSICAL INSTRUMENTS / AUDIO EQUIPMENT***

MODULES FOR AMPLIFIER, EFFECT GENERATORS, GRAPHIC EQUALIZER, PRE-AMP...

# MAJOR BENEFITS

- HIGH PRODUCT RELIABILITY
- INCREASED PRODUCT INTEGRATION
- IMPROVED CIRCUIT MINIATURIZATION
- MODULAR ADVANTAGES
- COPY PROTECTION
- GLOBAL COSTS REDUCTION



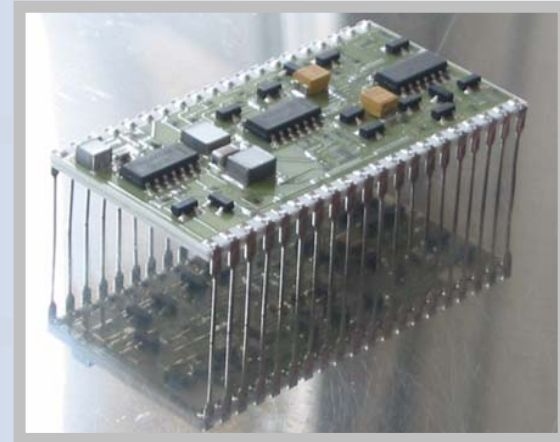
Hybrid circuits are subjected to both passive and active trimming by modern laser techniques, thereby offering closer working tolerances.

Hybrid microcircuits are fully tested as **single components**, and as a result, are far more reliable than the equivalent traditional circuits made up of many discrete components. Many solder joints are eliminated by using screened resistors; circuits operate at **lower temperature**, thus increasing life expectancy.

- **One single component to purchase instead of many**
- **Reduced inventory**
- **Reduced incoming inspection**
- **Easier assembly, therefore, lower assembly costs**
- **Fewer rejects due to improved reliability**
- **Reduced manpower needs on assembly and administration**
- **Easier failure analysis and eventual repairs**

# CONSISTENT PERFORMANCES

- FUNCTIONAL TRIMMING
- VERY CLOSE RESISTOR TOLERANCES
- WIDE RESISTORS RANGE
- HIGH TEMPERATURE WORKING
- GREAT THERMAL MANAGEMENT
- BETTER RF FEATURINGS
- HIGH VOLTAGE OPERATING



The resistors can be trimmed to any size using computer-controlled laser trimming systems. Resistors can be **ratio-trimmed** or in **functional** way trimmed.

Using Thick Film on ceramic substrata, it is possible to **reduce loss** in high frequency circuits, so their RF featurings are strongly improved.

Ceramic Thick Film conducts the heat away from circuits, allowing **greater circuit density**, greater reliability and cooler operations.

Ceramic-based materials have a dramatically **higher breakdown voltage** when compared to printed circuit boards, making them ideal for higher voltages.



# TECHNOLOGIES & DESIGN



TELECONTROLLI PERSONNEL KNOW-HOW, AS WELL AS COMPANY TECHNOLOGY CAPABILITY, ARE PRINCIPAL RESOURCES TO GUARANTEE GREATEST PERFORMANCES OF YOUR PROJECTS.

SEVERAL PATENTED PROCESSES, LIKE LASER TRIMMED COIL, DRIVEN COMPANY AHEAD IN GREAT COMPETITION MARKETS SO OUR RESEARCH IS IN CONTINUOUS GROWTH.

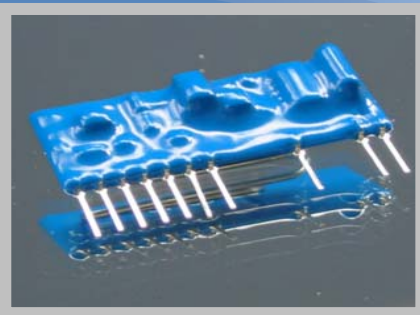
TELECONTROLLI DESIGN GROUP OFFERS ITS CUSTOMERS THE BEST SOLUTIONS WHEN DESIGNING AN ELECTRONIC DEVICE USING HYBRID MODULES.

LAYOUT AND ARTWORKS ARE PERFORMED IN-HOUSE USING NEWEST DESIGN AND PHOTOPLOTTING TOOLS.

PRODUCTION CAPABILITY IS OVER 350,000 MODULES PER MONTH: WE CAN PROVIDE FOR DEVICE MOUNTING SMT, SILICON DIE, WIRE BONDING, BGA.

MODULES CONFIGURATION ARE AVAILABLE IN SINGLE-IN-LINE PACKAGE, DUAL-IN-LINE PACKAGE, MULTI LAYERS, DOUBLE SIDED, ON ALUMINA ( $AL_2O_3$ ) OR ORGANIC SUBSTRATA (FR4)

SEVERAL TYPES OF MODULES COVERAGE OR PACKAGING CAN BE REALIZED TO GUARANTEE RELIABILITY AND LONG LIFETIME ALSO IN CRITICAL EMPLOYMENT CONDITIONS



# MANUFACTURING PROCESS



- **PRINTING**

SCREEN PRINTING OF PATTERNS ON 96% ALUMINA SUBSTRATE PERFORMED BY AUTOMATIC PRINTERS IN CLEAN ENVIRONMENT UP TO 1000 CLASS

- **FIRING**

HIGH TEMPERATURE INKS FIRING (FROM 600°C TO 850°C) IN CONTINUOUS CONTROLLED CONDITIONS

- **LASER TRIMMING**

TRIMMING IS A KEY ELEMENT IN THICK FILM TECHNOLOGY. RESISTORS, CAPACITORS, INDUCTORS ARE TRIMMED WITH LASER BY AUTOMATED PROCESS TO GET VERY NARROW TOLERANCE AND STABLE VALUE

- **SCRIBING AND DRILLING**

SCRIBING AND DRILLING ARE PERFORMED USING CO<sub>2</sub> LASER

- **MOUNTING**

AUTOMATED SURFACE MOUNT ASSEMBLY EQUIPMENT PLACING FROM 0402 TO BGA, DIE MOUNTING AND WIRE BONDING; DOUBLE SIDED ASSEMBLY CAPABILITY

- **COVERING/PACKAGING**

PLASTIC OR METAL BOX SHIELDING; RESIN, EPOXY, GLASS COVERAGE



# TYPICAL THICK FILM FEATURINGS

## **Substrate :**

Allumina	Al <sub>2</sub> O <sub>3</sub> 96%
Thermal Conductivity	21 W/m°C
Thermal Expansion	7,1 10 <sup>-6</sup> /°C
Dielectric rigidity	24 KV/mm
Dielectric constant K	9,5 (at 1 MHz )
Dimensions	101,6 x 114,3 mm
Thickness	0,63 -:- 1,00 mm
Holes diameter	0,3 mm (typical)
Dissipation	0,5 W/cm <sup>2</sup>

## **Conductors :**

Resistivity	mOhm/square
AgPd	25
AuPt	60
Au	8
AgPt	4
Ag	2
Width Resolution and spacing	0,3 mm (minimum 0,1 mm)

## **Resistors :**

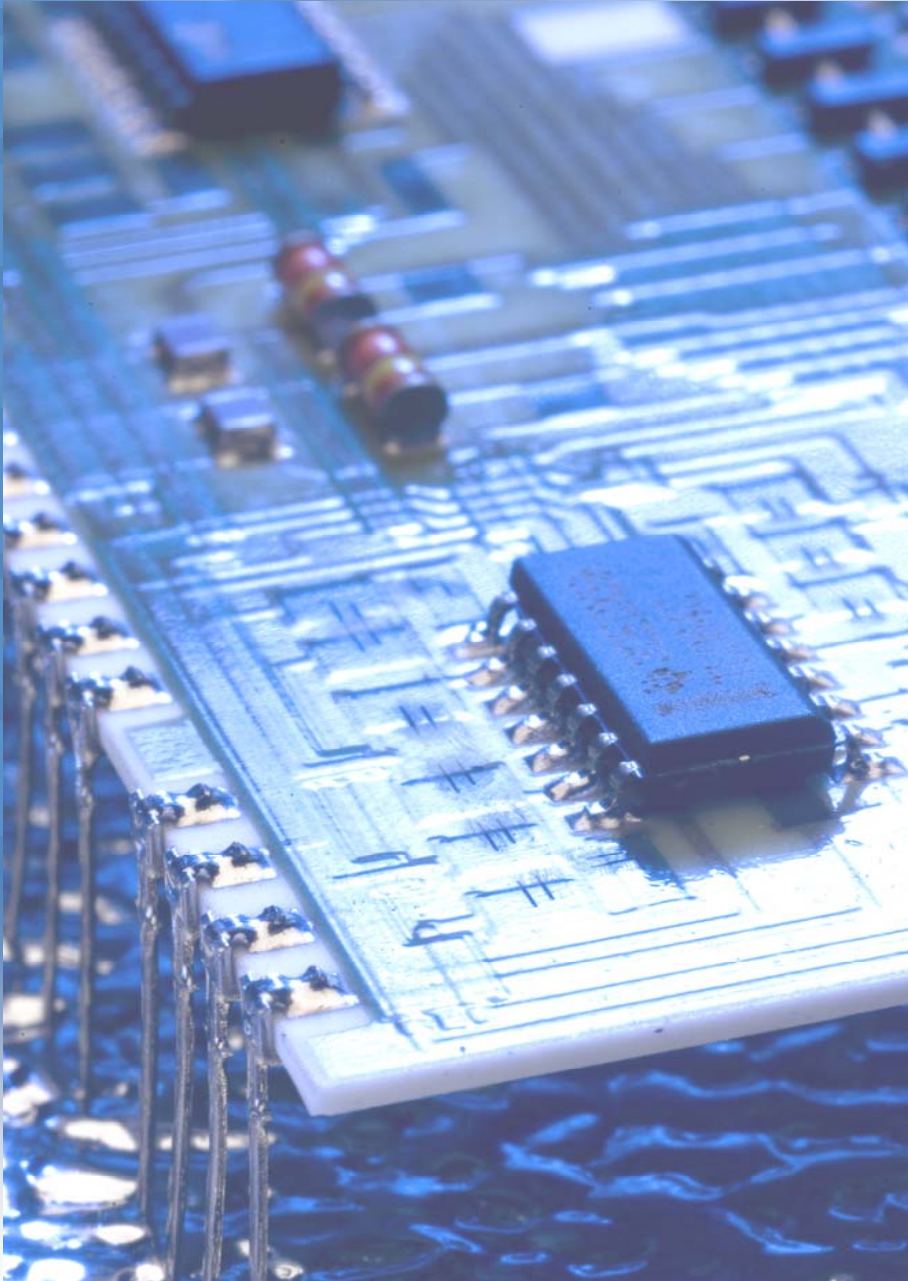
Values	0,1 -:- 1000x10 <sup>6</sup> Ohm
Tolerance Absolute	min 0,5%
Resistors Ratio	min 0,25%
Thermal coefficient	-55/+125°C ppm/°C
Thermal coefficient of a ratio	-55/+125°C ppm/°C
Dissipation	0,30 W/mm <sup>2</sup>
Electrical field applicable	100 -:- 400 V/mm
Aging	1000 h, 125°C (typ 1%)

## **Thermistors :**

Values	10 -:- 10 x 10 <sup>3</sup> Ohm
Thermal coefficient	+1000 +/- 10% ppm/°C PTC
	-2500 +/- 10% ppm/°C NTC

## **Capacitors :**

Values, sp=50 um	3 -:- 100 pF/mm <sup>2</sup>
Nominal voltage	50 V
Breakdown voltage	2800 V / 50 um
Deviation from nominal value	+/- 20%



## **QUALITY**

ALL MODULES ARE TESTED WITH FULLY AUTOMATED PROCEDURES TO ENSURES STRICTLY QUALITY REQUIREMENTS FOR THE BEST PERFORMANCE RELIABILITY AND ENVIRONMENT RESPECT

IN COMPLIANCE WITH THE STANDARD  
ISO 9001 : 2000



# CONTACTS

## **SALES**

### **DOMESTIC MARKET**

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# LOCATION

## **HEAD OFFICE AND PLANT**

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