Bourns®
Product Profile

Table of Contents

COMPONENTS
Trimpot® Trimming Potentiometers ...........................................1
Linear Motion Potentiometers ................................................2
Fuel Cards .............................................................................3
Resistor & RC Networks ........................................................4
Switches ...............................................................................5
Chip Resistors & Chip Arrays ...................................................6
Modular Contacts ................................................................6
Inductors & Transformers .....................................................7
Thin Film on Silicon Networks ...............................................8
Integrated Passive & Active Devices using CSP ......................9

CIRCUIT PROTECTION
Multifuse® Resettable Fuses ..................................................11
TSP Thyristor Surge Protectors .............................................12
Line Protection Modules ........................................................13
GDT - Gas Discharge Tubes ..................................................14
Telefuse™ Telecom Fuses ....................................................15
Chip Guard® ESD Protection Solutions ..............................16
Chip Diodes .......................................................................17

CUSTOMIZED PACKAGING
Microelectronic Modules .......................................................18

POWER SUPPLIES
DC/DC Converters ................................................................19

SENSORS AND CONTROLS
Commercial Panel Controls & Encoders ..............................20
Industrial Encoders ..............................................................21
Industrial Panel Controls ......................................................22
Precision Controls ...............................................................23
Turns-Counting Dials ............................................................24
Sensors & Controls Custom Solutions ................................25

Types Available:
• Surface mount
• Through-hole
• Single-turn
• Multiturn
• Sealed
• Open frame

Features:
• Top, bottom, side, front, and back adjust
• 2 mm – 12.7 mm sizes
• Tube, bulk, embossed tape, ammo pack, “radial” tape and reel
• Compatible with pick and place equipment

Applications:
• Brightness/contrast controls
• Micro controllers
• Phone head sets
• Power supplies
• Credit card readers
• CATV decoders
• Plasma televisions
• LCD controllers
• Lighting controls
• Smoke detectors
• Speakers
• Industrial PCs
• Temperature sensors
• Torque sensors
• Base stations
• Stereo equipment
• Voltage meters
• Magnetic card readers
• RF meters
• Controller daughter boards
• Printers
• Two-way radios
• Security systems
• Disk drives
• Satellite receivers
• A/D converters
• Missiles
**Linear Motion Potentiometers**

**Types Available:**
- Rectangular body
- Flexible lead
- Conductive plastic element

**Features:**
- 0.12 to 0.25 watt power ratings
- 3.81 mm to 12.7 mm stroke lengths
- 500,000 cycles actuation life
- 1k ohm to 50k ohm standard resistance values

**Applications:**
- Position sensing
- Copy machine cassette paper size selector
- Infusion pumps
- Rear view mirror position feedback

---

**Fuel Cards**

**Types Available:**
- Rectangular ceramic substrates
- Custom shape ceramic substrates
- Various ink systems:
  - Resistor
  - Terminations/wiper tracks
  - Protective glazes/polymers
- Wires attached
- Tinned solder pads
- Single or double side printing

**Features:**
- Customer specific patterns
- Up to 100 discrete resistance steps
- Typical resistance ranges 95 ohms to 1.7K ohms
- Rated current 100 mA
- In line, 100% dynamic electrical current test
- Life cycles:
  - Up to 1 million dry
  - Up to 3 million wet

**Applications:**
- Fuel level sending in fuel delivery systems:
  - Scooters/Motorcycles
  - Passenger cars
  - Light duty trucks
  - SUVs
  - Off-road equipment
Components

Resistor & RC Networks

Types Available:
- Thick-film resistor networks
- Thin-film resistor networks
- Resistor/capacitor (RC) networks
- Capacitor networks

Features:
- Surface mount and through-hole mounting
- SIP and DIP packages
- Molded and conformal-coat packages
- Standard resistance values from 10 ohms to 10 megohms
- Custom networks for non-standard circuits and values
- SIP package height as low as 0.195 inch
- Operating temperature range of –55°C to +125°C

Applications:
- Access equipment
- Bar code scanners
- Cable boxes
- Computer peripherals
- Consumer electronics
- Data communication
- Fax equipment
- Modems
- Monitoring equipment
- Portable power generators
- Satellite systems
- Telecom switching devices
- Test equipment

Types Available:
- Rotary
- Tactile
- DIP

Features:
- Surface mount and through-hole mounting
- PC pins, gull wing, and J-hook terminal styles
- Sealed and board-washable types
- 3, 4, 6, 7 mm and DIP sizes
- Tube, bulk, embossed tape, and ammo pack packaging

Applications:
- Instrumentation
- Industrial controls
- Communications equipment
- Computers
- Security systems
- Appliances
- Automotive
- Audio/visual
- Pagers
Chip Resisters & Chip Arrays

Types Available:
• Thick-film chip arrays
• Thick-film chip resistors

Features:
• Standard resistance values from 0.01 ohms to 10 megohms
• Chip resistors from 0402- to 2512-size
• Chip arrays from 0402 x 2-size to 0603 x 8-size
• Operating temperature range of –55°C to +125°C

Applications:
• Current sense
• Cellular and cordless phones
• Communications interface
• Flashlights
• Intercom systems
• Internet telephony
• Local area networks
• Measurement equipment
• Portable digital assistants
• Portable tools
• Remote controllers
• Telecom switching devices
• Test equipment

Modular Contacts

Types Available:
• Male
• Female

Features:
• Precious metal
• 2-6 contacts
• 2.54 mm, 4.0 mm pitch and height
• Through-hole and surface mount
• Normal force – 80 grams minimum
• Contact resistance – < 0.030 ohms
• Tube, embossed tape, 13” reel packaging

Applications:
• Cellular phones
• PDAs
• Laptop computers
• Rechargeable battery packs
**Inductors & Transformers**

**Types Available:**
- Chip Inductors
  - Laser-spiraled
  - Molded wirewound
  - Multilayer ceramic
  - Multilayer ferrite
  - Open wirewound
- Power Chokes
  - Non-shielded
  - Shielded

**Features:**
- Standard inductance values from 1.0 nH to 15 mH.
- 20 models of chip inductors
- More than 50 models of power chokes
- Available in a wide range of sizes
- Operating temperature as high as 125°C
- Sealed and open construction
- Surface mount and through-hole models

**Applications:**
- Battery chargers
- CD players
- Data communication
- Global positioning systems
- Internet equipment
- Local area networks
- Monitoring equipment
- Portable radios
- Portable tools
- Test equipment
- Televisions
- Video conferencing equipment
- Automotive
- Telecommunications

**Thin Film on Silicon Networks**

**Types Available:**
- Thin Film On Silicon Networks: 1%, 2%, 5% Standard, 0.8%, 0.5% Precision

**Features:**
- Isolated resistor, bussed resistor & termination networks
- RC & T filtering networks
- Diodes for ESD protection
- Low TCR & TTCR precision values
- SMD packaging with 8 to 28 pins depending on circuit

**Applications:**
- Computers
- Automotive
- Telecommunications
- Industrial controls
- Consumer products
- Medical products
- Instrumentation
Integrating Passive & Active Devices using CSP

**Types Available:**
- Devices with resistors
- Capacitors
- Inductors
- Diodes (Schottky, Zener and Varactor)
- Bipolar transistors

**Features:**
- Active & passive elements in a single package
- Excellent high frequency response
- EMI filtering networks
- ESD Protection to industry specifications
- 6 – 25 bumps depending on package

**Applications:**
- Low pass filters with ESD protection:
  - Dataport Interface
  - LCD Screen Interface
  - Headset Speaker
  - Headset Microphone
- Line termination
- Application specific circuits in:
  - Cell phones
  - PDAs
  - MP3 players
  - Digital cameras
  - Portable electronic devices

---

**Multifuse® Resettable Fuses**

**Types Available:**
- Radial leaded through-hole
- Surface mount (1206, 1210, 1812, 2018, 2920 and 3425)
- Axial leaded battery strap
- Unencapsulated disk

**Features:**
- 6 – 120 volt operating voltages
- Hold currents from 50 milliamps to 11.0 amps
- Low resistance battery protectors as low as 10 milliohms and as thin as 0.5 mm
- Interrupt voltages of 250 V and 600 V with surge capabilities for assisting in meeting US and international telecom requirements
- Custom designs available upon request
- Bulk, embossed tape, and ammo pack packaging
- Lead free

**Applications:**
- Computers
- Battery
- Automotive
- Telecommunications
- Industrial controls
- Consumer products
TSP Thyristor Surge Protectors

Types Available:
- Unidirectional
- Bidirectional
- Programmable

Features:
- Protection voltages from 15 V to 700 V
- Dedicated SLIC protection
- UL recognized
- Enables Telcordia GR-1089, UL 60950, FCC (TIA), ITU-T, IEC, YD/T compliance

Applications:
- Central office POTS
- Access equipment POTS
- xDSL and integrated linecards
- PABX protection
- VOIP protection
- Pairgain
- ISDN linecards and NT equipment
- 56k V.90 and V.92 modems
- Cordless DECT and analog phones
- Set top boxes

Line Protection Modules

Types Available:
- Through-hole
- Surface mount
- Multifunction modules

Features:
- Precision tolerance overcurrent protection
- Resistance values from 5.6 ohms to 100 ohms
- Withstands lightning surge and ac power cross
- Assists in meeting Telcordia GR-1089 and ITU-T K.20/K.21/K.45 specifications
- Operates safely under fault conditions
- Non-flammable
- UL 497A recognized
- One shot fuse options
- Resettable fuse options
- Custom designs available

Applications:
- Telecom circuit protection
GDT -
Gas Discharge Tubes

Types Available:
• TRIGARD® - 3 electrode balanced GDTs
• Mini-TRIGARD™
• MSP® protectors
• 2 electrode GDTs

Features:
• 75 V to 600 V operating voltages
• Multiple lead configurations
• Surface mount
• Tape and reel packaging
• Switch-grade failsafe
• UL, Telcordia, REA, IEEE, ITU-T and IEC recognition

Applications:
• Telecommunications
• CATV/Broadband
• Automotive
• Industrial and process control
• Transportation signaling
• Consumer electronics

Types Available:
• Surface mount

Features:
• Telecom overcurrent protection
• Withstands lightning surge and ac power cross
• Assists in meeting Telcordia GR-1089 and
  UL 60950 specifications
• Operates safely under fault conditions
• Lead free

Applications:
• Telecom circuit protection
Types Available:
MLA Series
- Multilayer varistor
- 0402 and 0603 SMT packages
- 5 V to 18 V voltage options
- 8 kV contact and 15 kV air discharge ESD withstand

Features:
- MLA: 8/20 μs and 10/1000 μs specified impulse capabilities
- MLC: Ultra-low capacitance of 0.5 pF max
- MLD: Low capacitance of 5 pF max
- MLE: 8/20 μs specification with bias voltage vs. leakage current specifications with the capacitance 9 pF for the CG0402MLE-18G.

Applications:
- MLA: General purpose ESD protection
- MLC: High speed communication ports such as USB 2.0, IEEE1394, 1Gb Ethernet
- MLD: Fast communication ports such as USB1.1, 10/100b Ethernet ports
- MLE: RC filter networks, RS232, RS422 & RS485 type applications

Types Available:
- Switching diodes
- Schottky barrier diodes
- Schottky rectifier diodes 1 A, 2 A, 3 A
- Transient voltage suppressor diodes 400 W, 600 W, 1500 W

Features:
- Surface mount devices
- Leadless - 0603 to 1206 package
- Leadfree - 0603 to 1206 package
- SMA, SMB, SMC packages available
- Tape & reel packaging

Applications:
- Cellular phones
- PDAs
- Desktop PCs & notebooks
- Digital cameras
- MP3 players
- Base stations
Microelectronic Modules

Types Available:
• Single in line package
• Dual in line package
• SMT
• BGA

Features:
• High density thickfilm
• Fine pitch SMT
• Chip & wire
• Flip chip
• Stud bump bonding

Applications:
• Telecommunications
• Fiber optic assemblies
• Instrumentation
• Industrial controls
• Medical equipment

DC/DC Converters

Types Available:
• Non isolated
• SLIC power
• Remote sense

Features:
• Ultra fast transient response time
• Tight efficiency and load regulation

Applications:
• Telecommunication
• Computer
• Industrial
• Instrumentation
Types Available:
Panel Controls
- Rotary
- Slide (open frame & metal housing types)

Features:
Mounting Options
- Bushing
- Bushingless
- PC Mount
Sizes (vary by model)
- 9 to 17 mm (rotary panel controls)
- 10 to 100 mm (slide panel controls)
- 12 and 16 mm square (encoders)

Options
- Panel controls:
  - Rotary switch option available on some models
  - Multi-cup option available on some models
- Encoders:
  - Detents available on some resolutions
  - Momentary push switch

Applications:
- Musical instrumentation
- Commercial audio equipment
- Consumer grade audio mixers
- DJ equipment
- Communications equipment
- Test and measurement instrumentation
- Consumer audio

Types Available:
Encoders
- Incremental contacting

Features:
Mounting options
- Bushing
- PC board
- Snap-in
Resolution
- Contacting – 6 PPR to 36 PPR options
- Optical – 25 PPR to 256 PPR options
Sizes (vary by model)
- 9, 16, 22 mm square, and 16 mm x 22 mm
Options
- Detents available on some models
- Momentary push switch available on some models

Applications:
- Audio-visual equipment
- Household appliances
- Musical instrumentation
- Professional audio
- Communications equipment
- Industrial heavy equipment controls
- Medical equipment and instrumentation
- Test and measurement instrumentation
- Scanners and copiers
Types Available:
• Rotary

Features:
Mounting options
• Bushing
• PC mount
• Snap-in
Output
• Linear
• Audio taper
• Custom taper
Sizes (vary by model)
• 9 to 23 mm

Terminal Styles
• PC pins
• Solder lugs
Options
• Flexible lead-wires
• Rotary switch option available on some models
• Multi-cup option available on some models
• Board wash seal option available on some models

Applications:
• Communications equipment
• Test and measurement instrumentation
• Amplifiers
• Medical instrumentation and equipment (excluding critical life support applications)
• Irrigation controls
• Video conferencing equipment
• Industrial equipment controls
• Environmental test equipment
• Automotive front panel controls

Types Available:
• Rotary
• Digital push-button

Features:
Mounting options
• Bushing
• PC mount
• Snap-in
• Servo mount
Output
• Linear
• Audio taper
• Custom taper
Sizes (vary by model)
• 13 to 51 mm diameter

Terminal Styles
• PC pins
• Solder eyelets
• Turret terminals
• Insulated flexible wire leads
Options
• Rotary switch option available on some models
• Single and multiturn models available
• Multi-cup option available on some models
• Board wash seal option available on some models

Applications:
• Communications equipment
• Test and measurement instrumentation
• Amplifiers
• Medical instrumentation and equipment (excluding critical life support applications)
• Industrial equipment controls
• Environmental test equipment
Types Available:
- Digital
- Concentric dial

Features:

Materials
- Metal (industrial)
- Plastic (commercial)

Turns
- 0 to 10
- 0 to 15
- 0 to 20
- 0 to 30

Sizes (vary by model)
- 22 to 46 mm

Options
- Black face and silver face dials available
- Locking brake

Applications:
- Power supplies
- Test and measurement instrumentation
- Medical instrumentation and equipment
- Industrial equipment controls
- Environmental test equipment
- Automation control panels

Types Available:
- Custom sensing solutions
- Custom integrated front panels:
  - Multiple controls on PCB
- Custom encoders and potentiometric devices with integrated electronics

Features:

- Custom solutions designed to fit your application
- Encoder, potentiometric and hall-effect solutions:
  - Contacting and non-contacting technologies
- High volume, low cost production
- Engineering support capabilities

Applications:
- Automotive:
  - Brake wear sensing
  - Electronic throttle control sensing
  - Throttle position sensing
  - Steering sensors
  - HVAC controls
- Test and measurement instrumentation
- Medical instrumentation (excluding critical life support)
www.bourns.com

Our interactive, user-friendly site contains the answers to your product and design questions with the most accurate and up-to-date Bourns information. Data sheets, application notes and other technical information are available in easy-to-download, PDF format. Visit our website, www.bourns.com

Reliable Electronic Solutions

Worldwide Sales Offices

<table>
<thead>
<tr>
<th>Country</th>
<th>Phone</th>
<th>Fax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benelux</td>
<td>+31 (0)70 300 4333</td>
<td>+31 (0)70 300 4345</td>
</tr>
<tr>
<td>Brazil</td>
<td>+55 11 5505 0601</td>
<td>+55 11 5505 4370</td>
</tr>
<tr>
<td>China</td>
<td>+86 21 64821250</td>
<td>+86 21 64821249</td>
</tr>
<tr>
<td>France</td>
<td>+33 (0)2 5473 5151</td>
<td>+33 (0)2 5473 5156</td>
</tr>
<tr>
<td>Germany</td>
<td>+49 (0)69 800 78272</td>
<td>+49 (0)69 800 78299</td>
</tr>
<tr>
<td>India</td>
<td>+91 484 302493</td>
<td>+91 484 302 287</td>
</tr>
<tr>
<td>Ireland</td>
<td>+353 (0)1276 691087</td>
<td>+353 (0)1276 691088</td>
</tr>
<tr>
<td>Italy</td>
<td>+390 2 389 00041</td>
<td>+390 2 389 00042</td>
</tr>
<tr>
<td>Japan</td>
<td>+81 49 269 3204</td>
<td>+81 49 269 3297</td>
</tr>
<tr>
<td>Malaysia (KL Office)</td>
<td>+60 3 71183138</td>
<td>+60 3 71183139</td>
</tr>
<tr>
<td>Malaysia (Penang Office)</td>
<td>+60 4 6582777</td>
<td>+60 4 6582771</td>
</tr>
<tr>
<td>Singapore</td>
<td>+65 63461933</td>
<td>+65 63461911</td>
</tr>
<tr>
<td>Switzerland</td>
<td>+41 (0)41 768 5555</td>
<td>+41 (0)41 768 5510</td>
</tr>
<tr>
<td>Taiwan</td>
<td>+886 2 25624117</td>
<td>+886 2 25624116</td>
</tr>
<tr>
<td>UK</td>
<td>+44 (0)1276 691087</td>
<td>+44 (0)1276 691088</td>
</tr>
<tr>
<td>USA</td>
<td>+1-909-781-5500</td>
<td>+1-909-781-5006</td>
</tr>
<tr>
<td>USA (after 7/17/04)</td>
<td>+1-951-781-5500</td>
<td>+1-951-781-5006</td>
</tr>
</tbody>
</table>

Non-Listed European Countries

<table>
<thead>
<tr>
<th>Technical Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia-Pacific</td>
</tr>
<tr>
<td>Europe</td>
</tr>
<tr>
<td>North America</td>
</tr>
<tr>
<td>North America (after 7/17/04)</td>
</tr>
</tbody>
</table>

"Ace," "Mini-TRIGARD" and "Telefuse" are trademarks of Bourns, Inc.
"Bourns," "Trimpot," "Hybritron," "Multifuse," "TRIGARD," "MSP" and "ChipGuard" are registered trademarks of Bourns, Inc. in the United States and other countries.

Copyright© 2004, Bourns, Inc. - Litho in USA - XX 5/04 K0411