

A leading supplier of 80C51-based microcontroller derivatives and power discretes, Philips Semiconductors is continually looking to broaden the application range for these devices. Combining our 51LPC family with industry-leading BTA2xx three-quadrant triac range has created a low system cost, low power consumption, improved reliability solution for general and industrial power control applications.

# 51LPC microcontrollers and three-quadrant triacs

## Simplifying the design of power control applications

By combining our 51LPC microcontrollers and BTA2xx three-quadrant triacs, Philips Semiconductors has made controlling resistive and inductive loads much simpler. This universal 'one-for-all' control solution covers low-power, highly inductive loads like solenoids, valves and synchronous motors, through to high power resistive loads like motors and heaters at mains supply voltages. Central to this two-chip solution's performance is a patented technique for detecting load current zero-crossings; this eliminates the need for a shunt resistor in the load circuit, simplifying the design and reducing overall system costs.

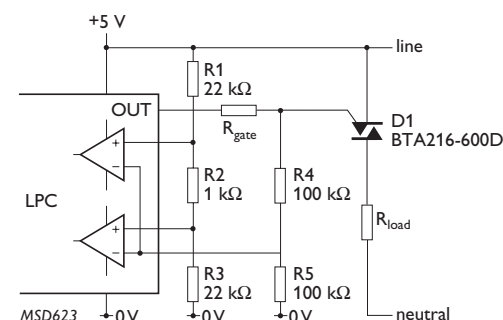
This simple microcontroller/triac combination offers designers an effective, programmable solution with minimum electromagnetic interference. The automatic application of the minimum gate pulse duration achieves latching for any load. By using a low supply current, only requires a resistive (or R-C) mains dropper supply.

Additional value-added features can be easily implemented such as remote control, soft start, error supervision and load current supervision with triac monitoring. Connecting sensors to either analog or digital inputs also provides intelligent closed-loop control of complete systems.

### Applications

This highly flexible power control option can be used in a variety of white goods, HVAC, power tools, appliances and industrial control systems, across a myriad of industrial and automation applications including motor control (AC/DC), valves, pumps and lamps.

Window comparator used as gate voltage and current zero crossing detector



### Key benefits of 51LPC microcontroller family

- Fast execution (2x existing 80C51 devices)
- Wide operating range (2.7 to 6.0V)
- User-configurable oscillator with crystal/resonator and RC (requires no external components)
- Low-current operation (25 mA\*), with idle (10 mA\*) and power-down (10  $\mu$ A\*) modes
- Rich feature set includes UART and I<sup>2</sup>C serial communication, brown-out detection, power-on reset and two comparators, plus a choice of ADC, PWM and DAC
- DIP20, SO20 and TSSOP20 package options

\* Maximum value at 5 V operation

### Key benefits of three-quadrant triacs

- No RC snubber network required, reducing overall bill of materials
- Enables more compact power control circuitry; cheaper to assemble
- Eliminates  $di_{COM}/dt$  limiting inductors
- Less prone to false triggering, improving circuit reliability
- Broad range of surface mount and leaded packages, covering many inductive/capacitive loads

# 51LPC microcontrollers and three-quadrant triacs

## 51LPC selection chart

Standard features: 128 bytes RAM, I<sup>2</sup>C interface, UART, 18 I/O, brown-out detection, power-on reset, keypad interrupt, 20-pins, 6-clock, internal oscillator

ROM (OTP)	ADC	PWM	Dual DAC	Package		
				SO20 (SOT163)	DIP20 (SOT146)	TSSOP20 (SOT360)
2 k				P87LPC762BD	P87LPC762BN	P87LPC762BDH
				P87LPC762FD	P87LPC762FN	P87LPC762FDH
4 k				P87LPC764BD	P87LPC764BN	P87LPC764BDH
				P87LPC764FD	P87LPC764FN	P87LPC764FDH
4 k	X			P87LPC767BD	P87LPC767BN	
				P87LPC767FD	P87LPC767FN	
4 k	X	X		P87LPC768BD	P87LPC768BN	
					P87LPC768FD	P87LPC768FN
4 k	X		X	P87LPC769HD		

Temperature indicator - B: 0 to 70 °C; F: -25 to +85 °C; H: -40 to +125 °C

## Three-quadrant triacs selection chart

I <sub>T (RMS)</sub> (A)	Voltage grades (V)	I <sub>GT (MAX)</sub> (mA)	Package				
			SOT223	DPAK (SOT428)	D <sup>2</sup> PACK (SOT404)	SOT186A (isolated TO220AB)	TO220AB (SOT404)
1	600 / 800	B/C/D/E/F	BTA204W				
4	600 / 800	B/C/D/E/F		BTA204S		BTA204X	BTA204
8	600 / 800	B/D*/E/F		BTA208S		BTA208X	BTA208
12	600 / 800	B/D*/E/F			BTA212B	BTA212X	BTA212
16	600 / 800	B/D*/E/F			BTA216B	BTA216X	BTA216
25	600 / 800	B/C			BTA225B		BTA225

I<sub>GT (max)</sub> - B: 50 mA; C: 35 mA; D: 5 mA; E: 10 mA; F: 25 mA

\* 'D' version triacs are only available in 600 V



## Philips Semiconductors

Philips Semiconductors is a worldwide company with over 100 sales offices in more than 50 countries. For a complete up-to-date list of our sales offices and distributor partners, please e-mail [sales.addresses@semiconductors.philips.com](mailto:sales.addresses@semiconductors.philips.com). A complete list will be sent to you automatically.

You can also visit our website <http://www.semiconductors.philips.com/sales/> or contact any of the following sales offices by phone or mail:

### North America

Philips Semiconductors  
811 E. Arques Avenue  
Sunnyvale, CA 94088  
United States

Tel. +1 800 234 7381  
Fax. +1 800 943 0087

### Europe, Africa, Middle East and South America

Philips Semiconductors International  
Fulfillment and Sales Support Center  
P.O. Box 366  
2700 AJ Zoetermeer  
The Netherlands

Fax. +31 79 3685126

### Asia Pacific

Philips Semiconductors Asia Pacific  
Market Response Management Center  
P.O. Box 68115  
Kowloon East Post Office  
Hong Kong

Fax. +852 2756 8271

### Japan

Philips Semiconductors  
Philips Building 13-37  
Kohnan 2-chome  
Minato-ku,  
Tokyo 108-8507

Tel. +81 3 3740 5130  
Fax. +81 3 3740 5057

## © Philips Electronics N.V. 2001

All rights are reserved. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice. No liability will be accepted by the publisher for any consequence of its use. Publication thereof does not convey nor imply any license under patent- or other industrial or intellectual property rights.

Date of release: February 2001 - Printed in the Netherlands

Document order number: 9397 750 08054

Let's make things better.



PHILIPS