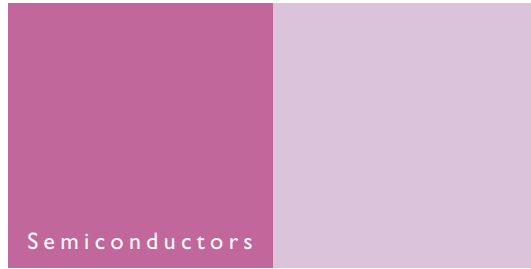
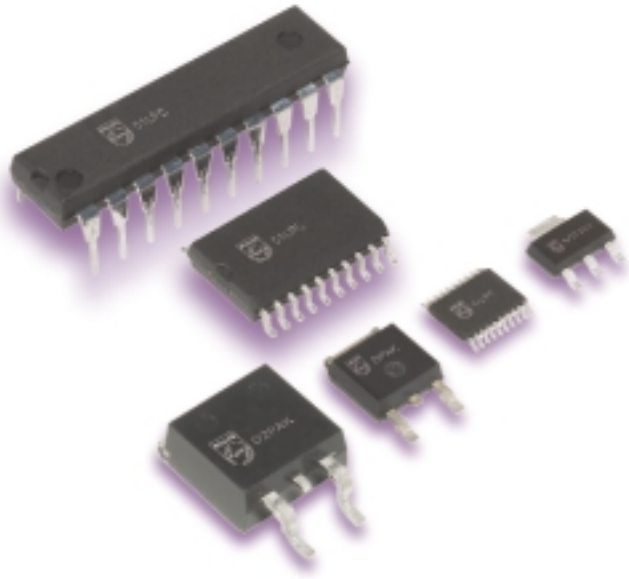


# 51LPC microcontrollers and three-quadrant triacs

## Simplifying the design of power control applications



### Description

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 loads like motors and heaters. 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.

### Benefits of 51LPC microcontroller family

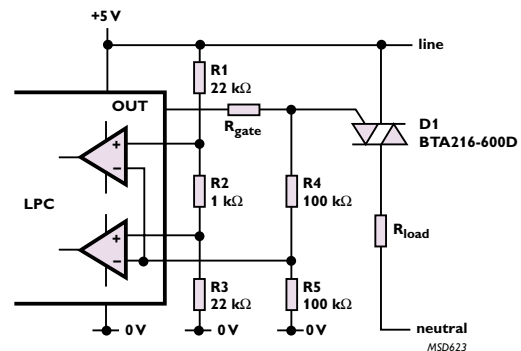
- Fast execution (2x existing 80C51 devices)
- Wide operating range (2.7 to 6.0 V)
- User-configurable oscillator with crystal/resonator and RC (requires no external components)
- Low-current operation (25 mA\*), with idle (10 mA\*) and power-down (10  $\mu$ A\*) modes
- Rich feature set includes UART 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

\* Maximum value at 5 V operation

### 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

Window comparator used as gate voltage and current zero crossing detector



# PHILIPS

# 51LPC microcontrollers and three-quadrant triacs

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## 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 (SOT-163)	DIP20 (SOT-146)	TSSOP20 (SOT-360)
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)	SOT-223	DKAK (SOT-428)	Package D <sup>2</sup> PACK (SOT-404)	SOT-186A (isolated TO220AB)	TO220AB (SOT-404)
1	600/800	B/C/D/E/F	BTA204V				
4	600/800	B/C/D/E/F		BTA204S		BTA204X	BTA204
8	600/800/1000	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

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