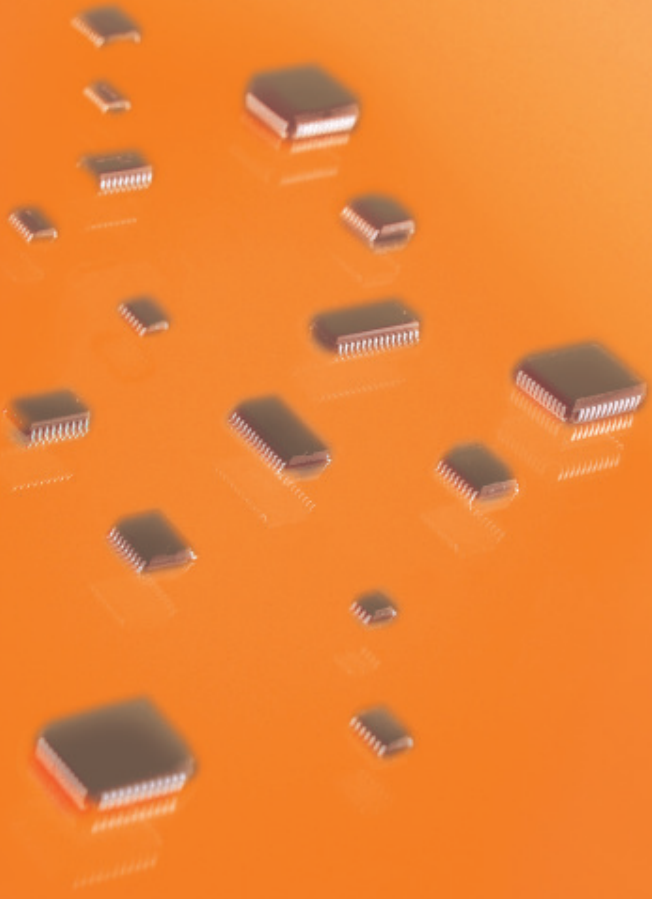


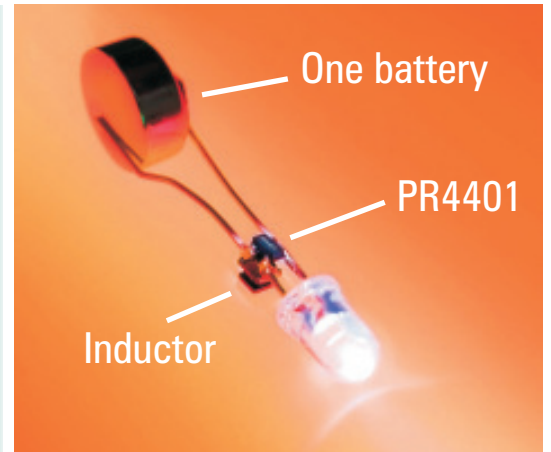
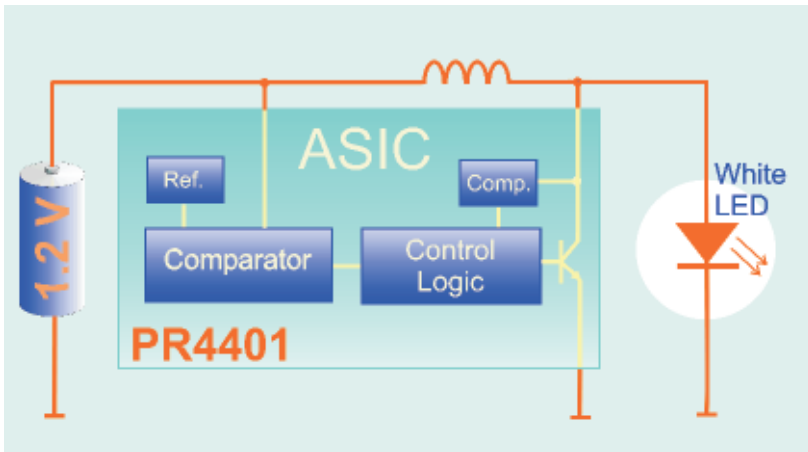
Bright Ideas for Bright Products

**Standard ICs
Catalog**



0.9V Boost Driver PR4401 PR4402 PR4406 for White LEDs

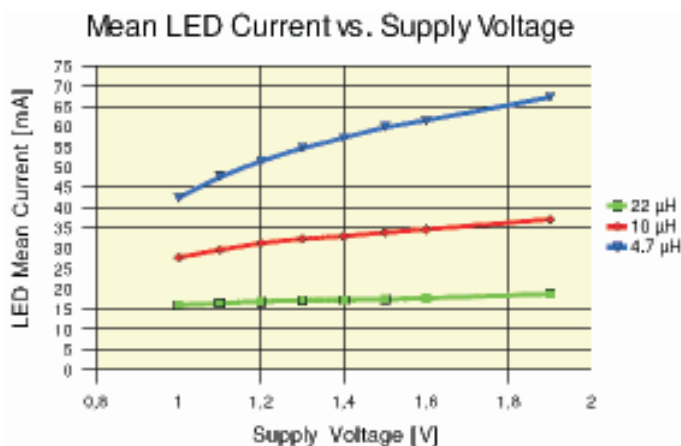
- > Small SOT23-3L package, tiny circuit
- > Drives white, blue or UV LEDs from a single battery cell / min. 0.9V
- > Constant output current
- > Simple and easy to use



Application examples:

- > miniature pocket torches
- > indicator lights for low-voltage circuits
- > LCD backlighting for watches and clocks
- > toys, model making
- > medical lights

Actual package size →



LED current vs. supply voltage for different inductances. Measured with PR4406, single LED and rectifier circuit at the output

Features:

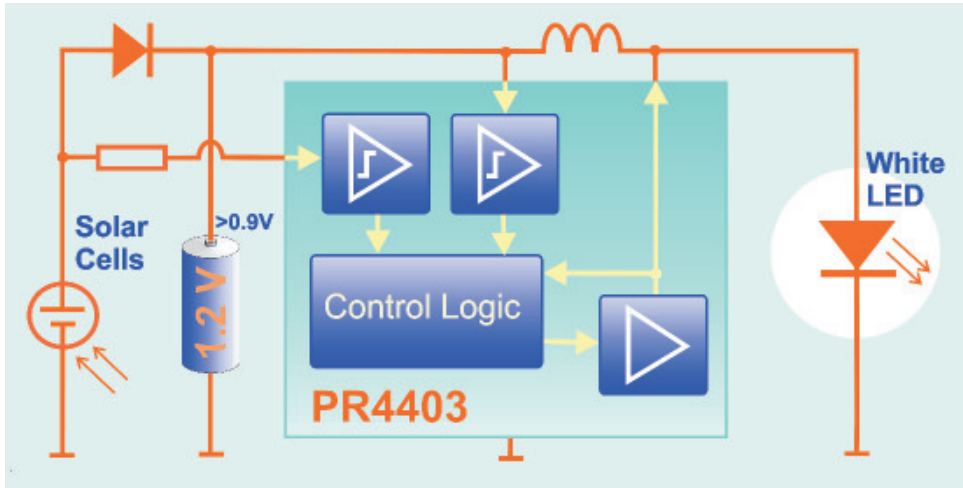
- > Boost driver with stabilised LED current over wide input voltage range
- > LED current
 - up to **20mA*** for **PR4401**
 - up to **40mA*** for **PR4402**
 - up to **50mA*** or **80mA⁺** for **PR4406**
- * V_{cc}=1.2V, one LED at output
- + V_{cc}=2.4V, one LED at output
- Actual current depends on circuit and components used
- > minimum input voltage 0.9V - allows use of single alkaline or NiMH cells with all LED types
- > PR4401, PR4402 for up to 1.9V, PR4406 up to 5V supply
- > SOT-23 package, lowest total cost
- > requires only a small inductor as external component at low LED currents; simple circuit for high LED currents
- > high efficiency of 80% and more
- > battery deep discharge protection
- > compatible with all LED types
- > LED current set by inductance

Status as of 09/2010: PR4401: series production, PR4402: series production, PR4406: in qualification

A data sheet can be obtained at <http://www.prema.com/pdf/pr4401.pdf>

0.9V Boost Driver PR4403 for Solar Lamps

- > Single-cell boost driver with special features for operation with solar lamps
- > Constant LED brightness
- > Minimum part count



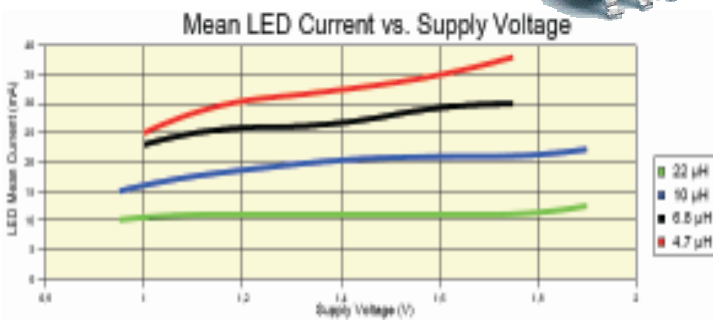
Application examples:

- > LED solar garden lamps
- > house number and sign lighting with solar cells
- > solar powered LED road markers
- > solar pocket torches
- > model making, toys using solar cells
- > solar battery chargers



Features:

- > boost current driver for up to 40mA with a direct connection to the solar cells
- > minimum input voltage 0.9V - allows the use of a single NiMH cell (1.2V)
- > requires only one inductor, one resistor and a Schottky diode as external components
- > no external photo sensor required (solar cell operates as a light sensor)
- > adjustable light threshold for switching on the LED
- > low current consumption
- > battery deep discharge protection



Status as of 09/2010: series production

A data sheet can be obtained at www.prema.com/pdf/pr4403.pdf

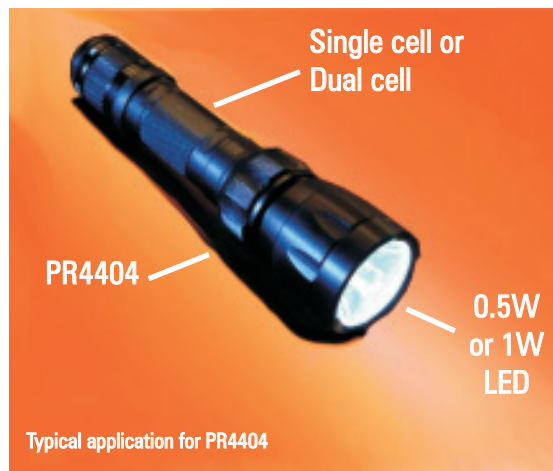
Selection Guide for LED Boost Drivers

PREMA Type	Input voltage	Max.output current	Package	Remark
PR4401 UI	0.9~1.9V	20mA*	SOT23-3L	
PR4402 UJ	0.9~1.9V	40mA*	SOT23-3L	
PR4403 SO	0.9~1.9V	40mA*	8L SOIC	for LED solar lights
PR4406 SJ	0.9~5.0V**	50mA* / 80mA ⁺	SOT23-3L	
PR4404 SZ	1.0~5.0V**	150mA* / 300mA ⁺	8L SOIC	

* Vcc=1.2V, one LED at output ⁺ Vcc=2.4V, one LED at output ** above 2.8V only with 2 LEDs in series

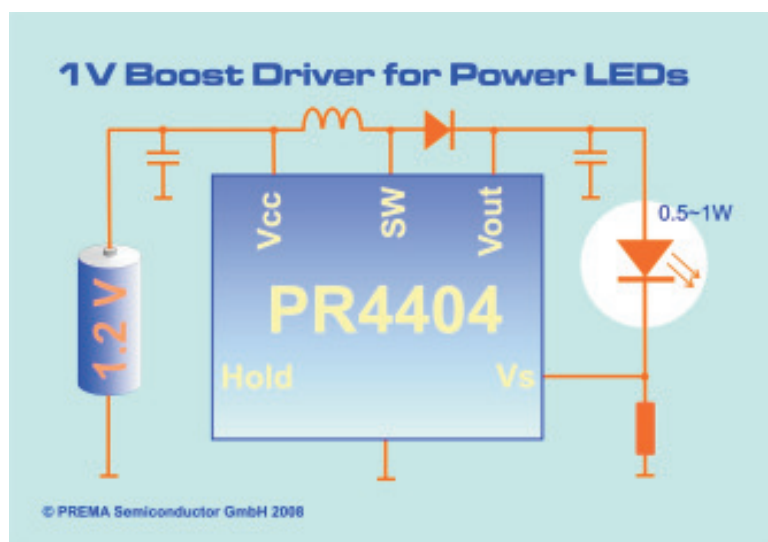
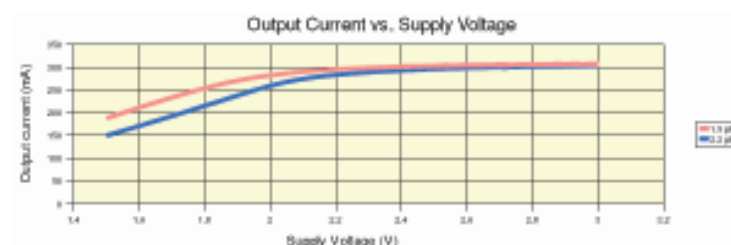
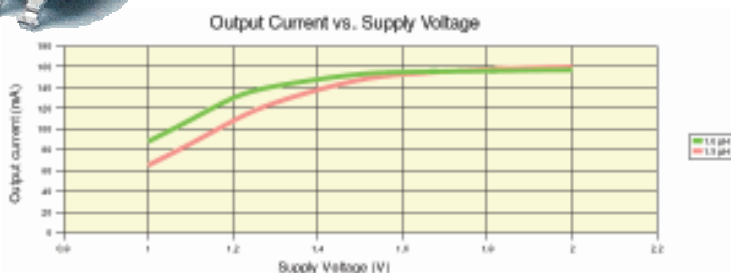
Low Voltage Boost Driver PR4404 for Power LEDs

- > Drives white LEDs with up to 300mA
- > Supply voltage down to 1.0V



Features:

- > supply by single or dual cell Alkaline or NiMH batteries
- > startup voltage 1.0V
- > hold voltage less than 1.0V
- > output current up to 300mA
- > battery deep discharge protection
- > output voltage up to 17V
- > control input e.g. for switching with μ C signal
- > PWM brightness control with external circuitry



Application examples:

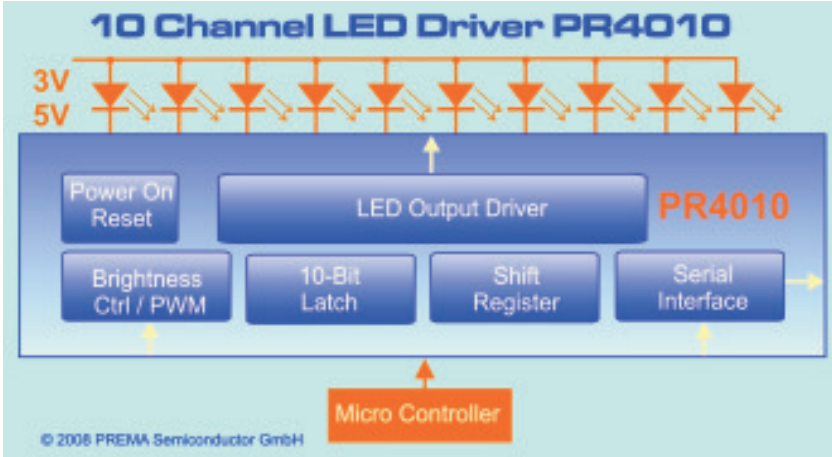
- > Power flashlights
- > Camera spotlights
- > Alarm flashers
- > Home lighting
- > LCD panel backlighting
- > Decoration lights
- > Toys
- > Battery charging

Status as of 09/2010: series production

A data sheet can be obtained at www.prema.com/pdf/pr4404.pdf

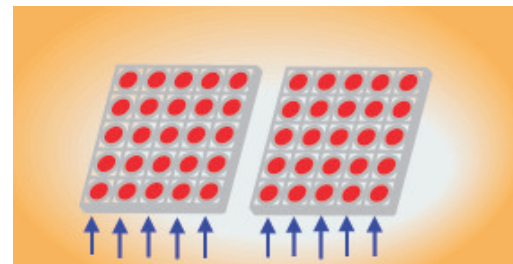
10-Channel LED Driver PR4010 Constant Current

- > 10 constant current sink channels up to 10mA
- > Cascadable, serial interface



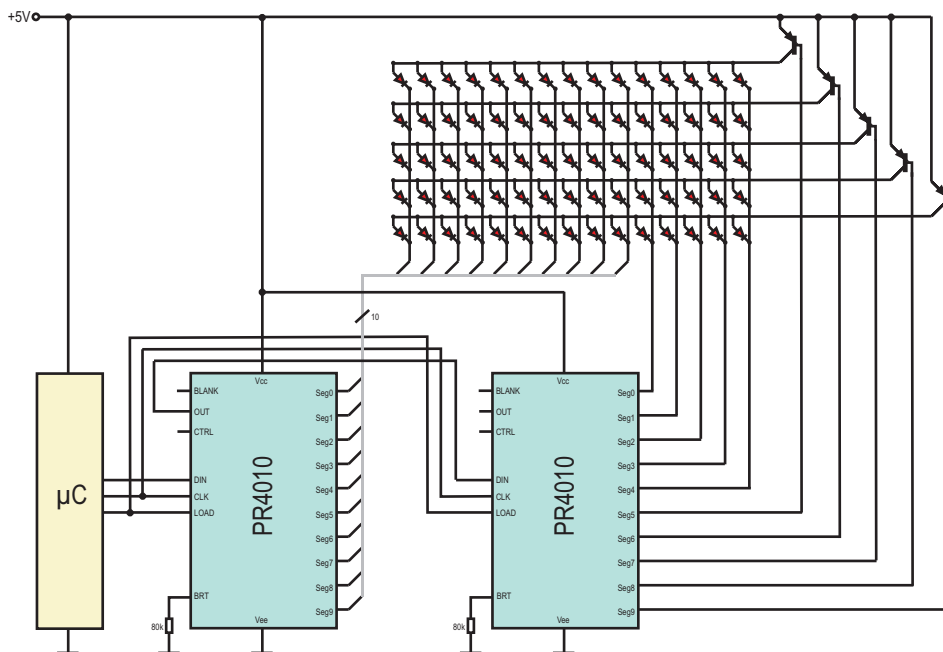
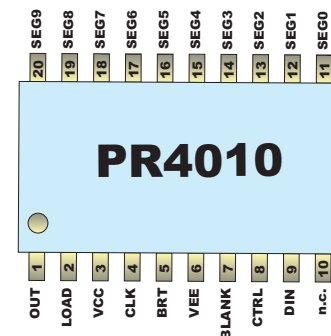
Application examples

- > Dot matrix LED displays
- > Indicator signs
- > Instrument displays
- > Bargraph displays



Features

- > 10 current sink channels for up to 10mA
- > Supply voltage 5V or 3.3V
- > External brightness control via resistor
- > Serial interface, shift register with latch
- > Cascadable, communication via microcontroller
- > Blank input
- > Control input for inverting the LED channels



Status as of 09/2010: series production

PR4010: cascaded to operate a total of 75 LEDs in a multiplexed application with two drivers

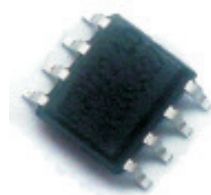
A data sheet can be obtained at www.prema.com/pdf/pr4010.pdf

LED Buck Drivers

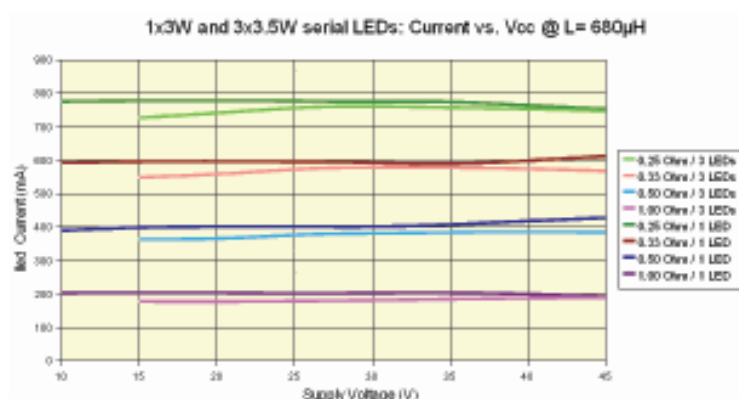
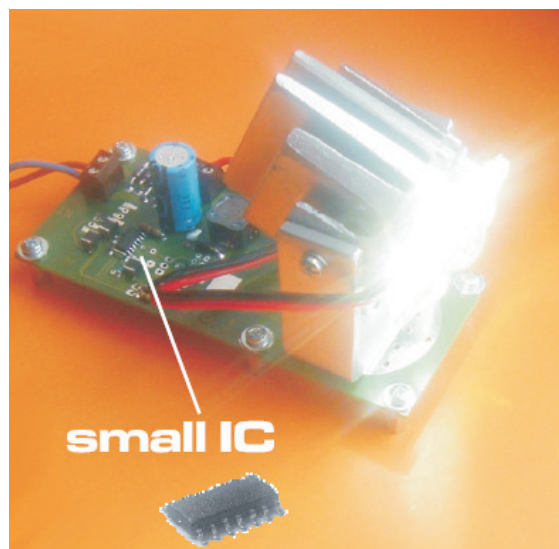
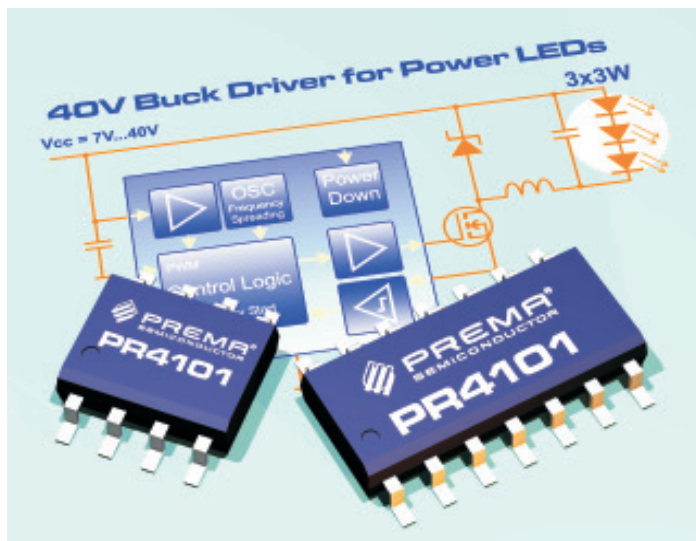
PR4101

PR4103

for more than 9W



- > Power LED drivers for up to 40V supply voltage
- > driving more than 9W output power with external switch
- > Small package SOT23-5L for PR4103



LED current vs. supply voltage for different values of Rs and L

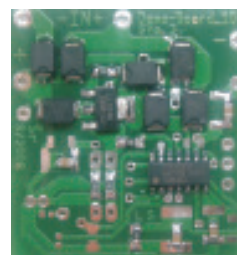
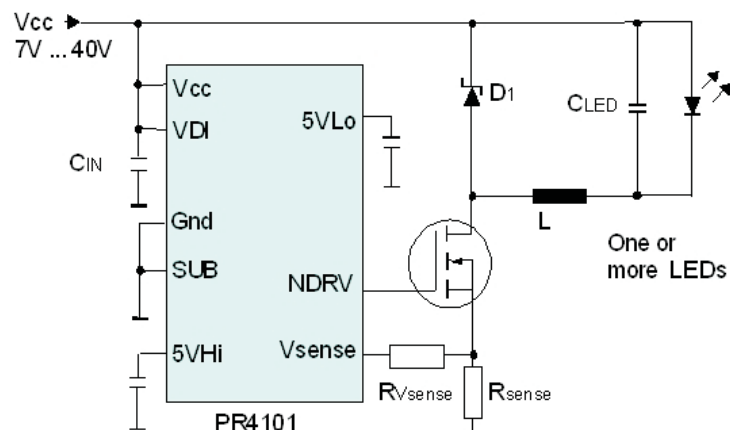
Application examples:

- > Halogen replacement by LEDs
- > Indicator signs
- > General illumination
- > Warning lights
- > Automotive lighting

Features

- > LED current more than 1A with ext. switch
- > Supply voltage from 7V up to 40V (PR4101A/B) or up to 21V (PR4103)
- > Dimming with standard dimmer
- > Brightness control with PWM (PR4101A)
- > Current temperature compensation (PR4101A/B)
- > Soft start feature (PR4101A/B)
- > Overtemperature protection (PR4101A/B)
- > Frequency spreading for low EMI (PR4101A/B)
- > Low standby current of < 35 μ A
- > Package SOP14 PR4101A SOP8 PR4101B SOT23-5 PR4103

Circuit for PR4101 and PR4103



Demoboard
35 mm x 35 mm

Status as of 09/2010:
PR4101: series production
PR4103: samples available in S08

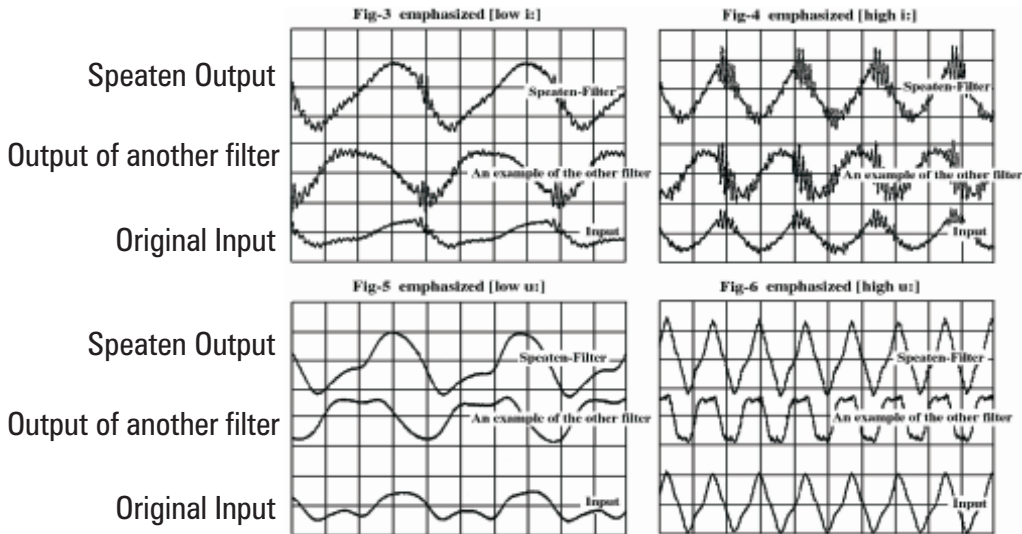
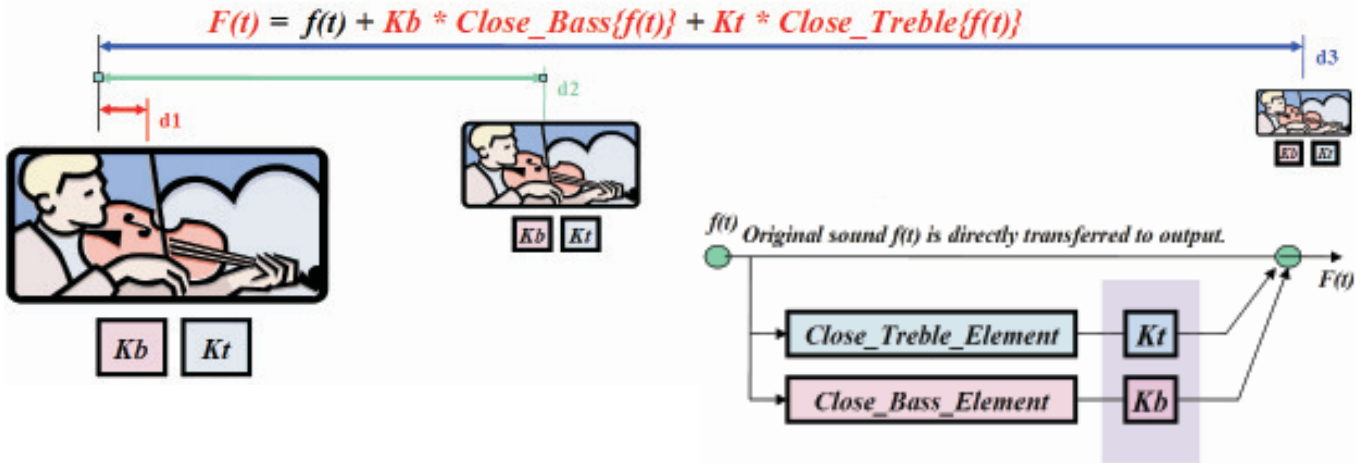
A data sheet can be obtained at www.prema.com/pdf/pr4101.pdf or [/pr4103.pdf](http://www.prema.com/pdf/pr4103.pdf)

Audio enhancement MZ-01 with Speaten Filter*

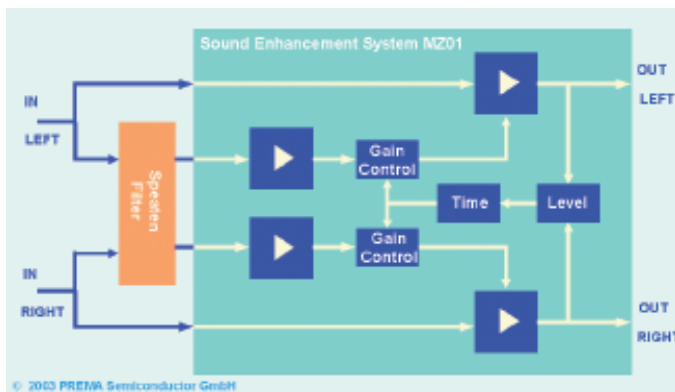
* Speaten Filter by Dedekind R & D

- > Car Audio Enhancement
- > LCD Monitor Stereo Function
- > Portable Audio and Video
- > Voice Recorders and Phones

> MZ-01 with Speaten Filter controls the perceived distance of sound:



Comparison of waveforms of Speaten Filter with other filters



Block diagram of MZ-01

Features

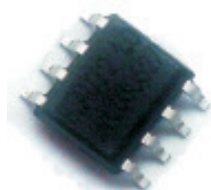
- > Great sound enhancement at low cost
- > Surround Sound function available
- > 2V operation possible for portable applications
- > SO-16 package (without surround) or SO-20 package (with surround)

IC made by PREMA. For detailed information on Speaten Filter, please contact Dedekind R&D, 436 Nishiyama, Kamihachiman-cho, Tokushima, 770-8041 JAPAN
www.dedekind.jp · email: sales@dedekind.jp



65V Buck Converter PR6502 down to 3.3V

- > With new energy saving regulations appliances with standby mode must draw less than 0.5W from power line when idle.
- > PR6502 offers a simple and cost-effective method to deliver up to 3.3V/15mA under these constraints to e.g. a μC and control a relay to switch the load.



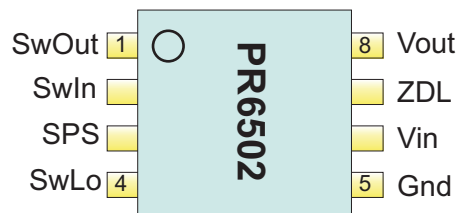
- > Converts up to 65V to 3.3V
- > For low standby power circuits with mains supply
- > Up to 30mA output current
- > With integrated relay controller

Applications

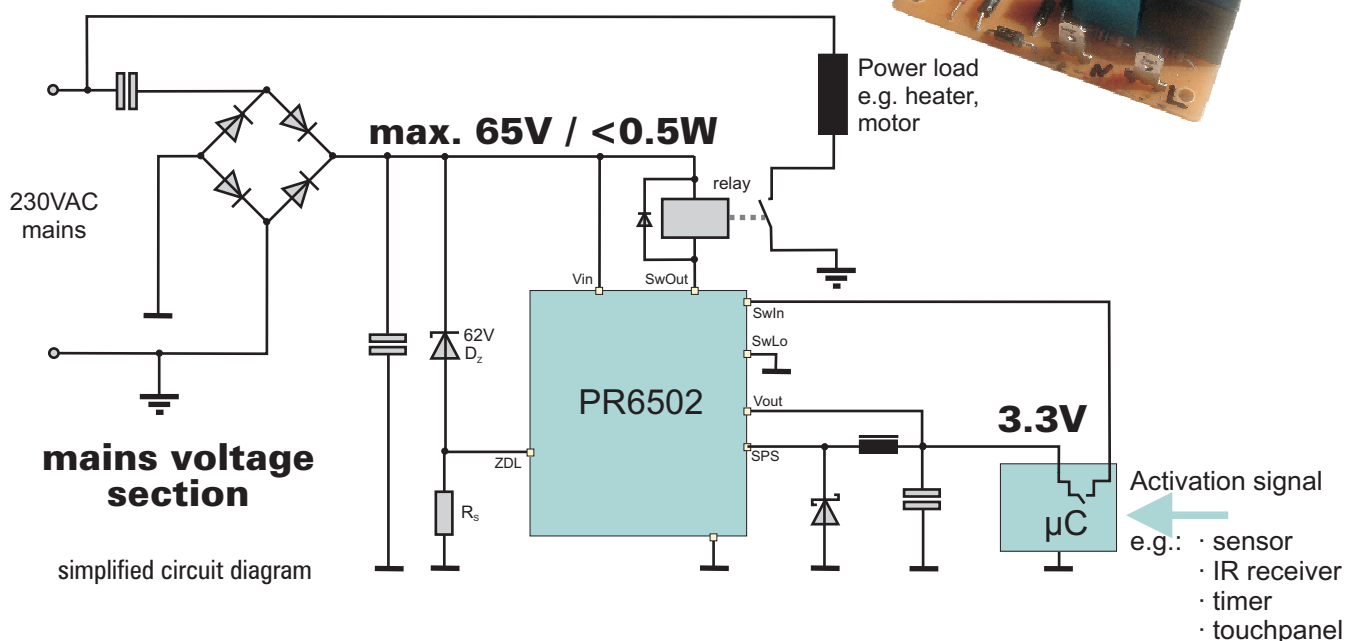
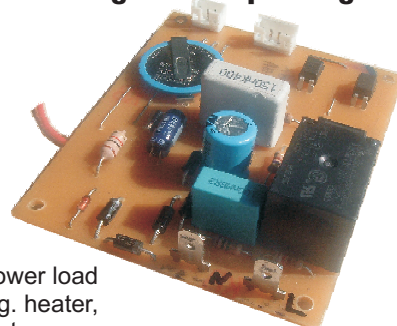
- > Domestic appliances
- > Office machines
- > TV sets and Hi-Fi systems
- > Air conditioners
- > Battery chargers

Features

- > up to 65V input voltage range for high overall efficiency
- > Output current up to 30mA (depending on input current)
- > Integrated bipolar switching transistor
- > Stable output voltage 3.3V or 5V programmable
- > Application circuits for low standby power available
- > Additional relay driver transistor that controls a relay from logic level input
- > Shunt regulator that allows current savings by re-using the relay current as 3.3V output current



Pinning of S08 package

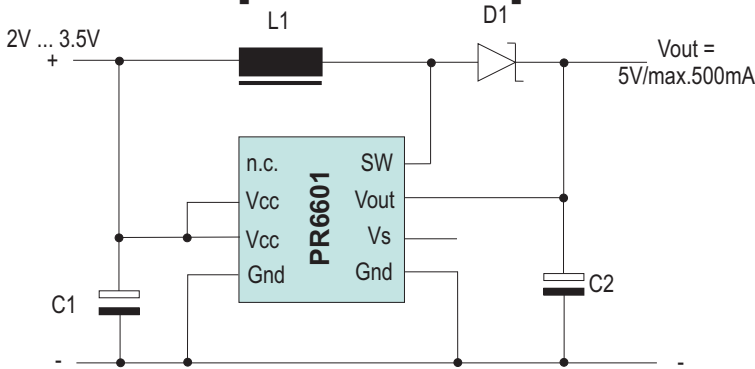


Status as of 09/2010: series production

A data sheet can be obtained at www.prema.com/pdf/pr6502.pdf

Boost Converter with **PR6601** USB compatible output

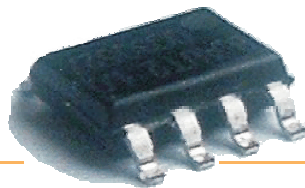
- > Converting from 3V to 5V
- > Battery Charging with up to 500mA
- > Automatic Shut Down to <math><10\mu A</math>



Features

- > Minimum startup voltage 2.0V
- > Supply by two battery cells
- > Low number of external components
- > Automatic shut down into standby mode at no load
- > Standby current less than $10\mu A$
- > Constant current driving mode for Power LEDs

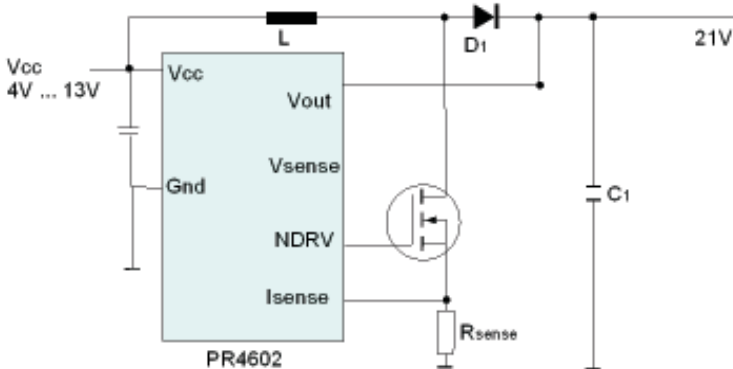
Alternatively constant current output for 2W LEDs - up to 700mA



Status as of 09/2010: in qualification

Boost Converter **PR4602** from 4V to 13V input

- > Converts 4 to 13V input to 21V output voltage
- > High current battery applications with external switch
- > Output current of more than 1A possible



Applications and Features

- > Battery powered systems
- > Supply of LED chains
- > Adjustable output voltage
- > Overtemperature protection

Status as of 09/2010: in qualification

A data sheet can be obtained at www.prema.com/pdf/pr6601.pdf or [/pr4602.pdf](http://www.prema.com/pdf/pr4602.pdf)

Selection Guide for DC-DC Converters

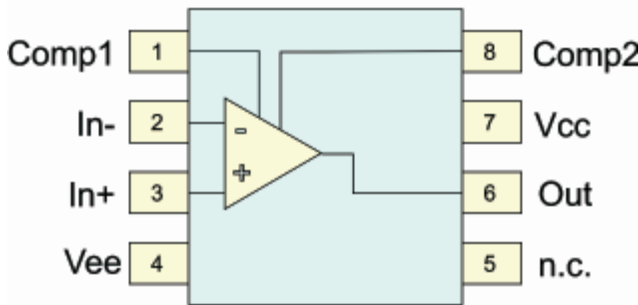
PREMA Type	Input voltage	Output voltage	Current	Package	Remark
PR6502 UX	up to 65V	3.3V/5V	30mA	8L SOIC	for standby circuits
PR6601 SR	2V~5V	5.25V	500mA	8L SOIC	for USB plug battery charging
PR4602 UU	4V~13V	21V ⁺	- -	8L SOIC	ext. MOS switch

*base current limitation

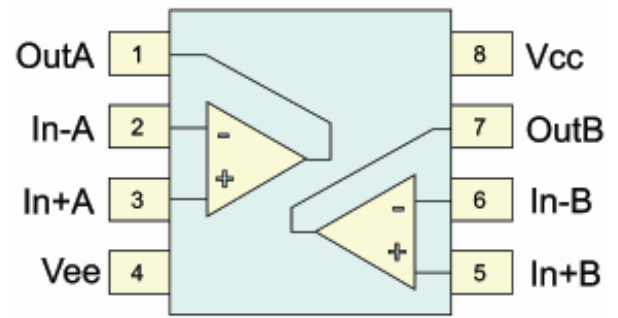
⁺ adjustable

High Voltage PR2201 PR2202 Operational Amplifier

- > Supply voltage up to 80V
- > Near rail-to-rail-output
- > Input differential voltage up to 60V
- > Low quiescent current
- > Single or dual amplifier



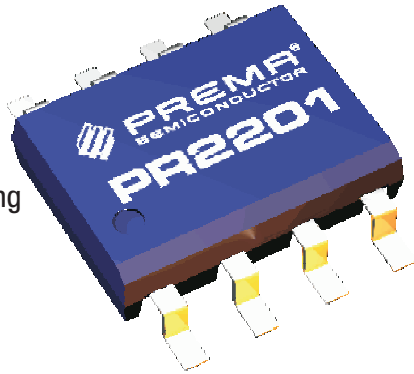
Pinout of the PR2201



Pinout of the PR2202

Applications

- > Power Amplifiers
- > Data acquisition
- > Signal conditioning
- > Test equipment
- > Piezo drivers



Features

- > Supply voltage up to 80V or +/-40V
- > Input differential voltage up to 60V
- > Near rail-to-rail common mode input
- > Near rail-to-rail output
- > JFET input stage with very low input bias current
- > Output current up to 6mA
- > Gain bandwidth product > 1MHz
- > Low quiescent current of less than 0.7mA

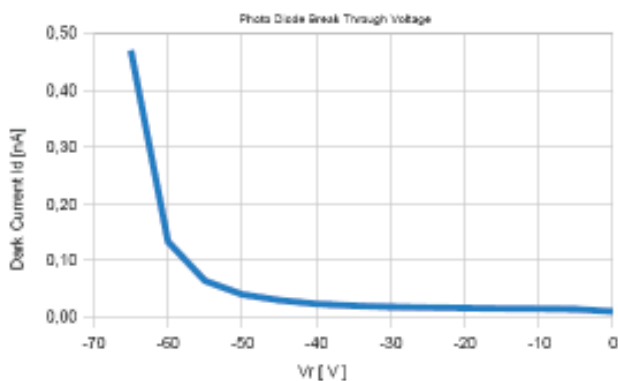
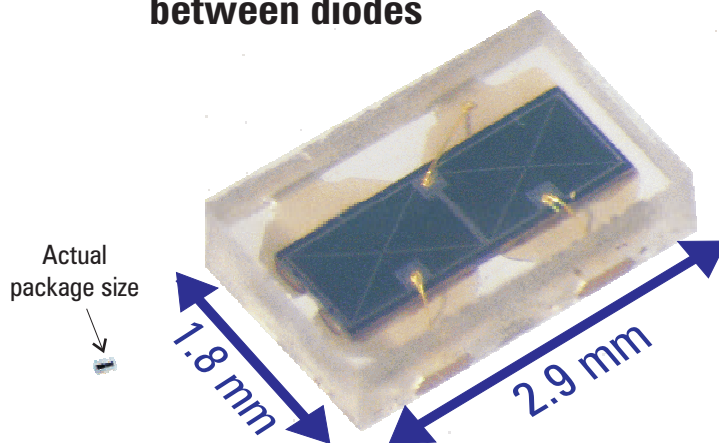
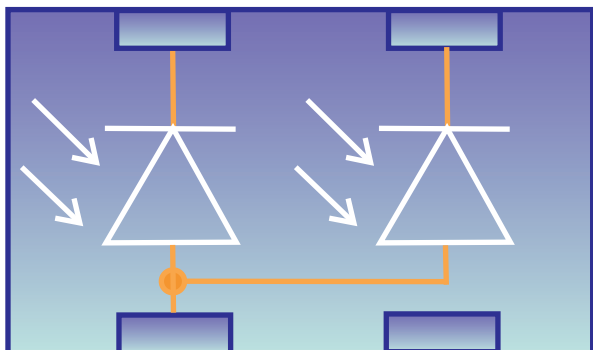
Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage $V_{CC} - V_{EE}$				80	V
Quiescent current	$V_{OUT} = (V_{CC} - V_{EE})/2$, $I_{OUT} = 0$ for PR2201 (per channel for PR2202)		500	700	μA
Common mode input voltage		$V_{EE} + 1.5V$		$V_{CC} - 2.0V$	
Differential mode input voltage	$V_{IN+} - V_{IN-}$	-60		+60	V
Output voltage		$V_{EE} + 1.0V$		$V_{CC} - 1.0V$	
Output current	$V_{OUT} = V_{EE} + 2V \dots V_{CC} - 2V$	5	6		mA
Input bias current			± 5	± 100	pA
Common mode rejection ratio		90	120		dB
Supply voltage rejection ratio		85	110		dB
Input offset			± 2	± 10	mV
Slew rate low => high	$R_L = 500 \Omega$; $G = 1$		0.8		V/ μs
Slew rate high => low	$R_L = 500 \Omega$; $G = 1$		1.2		V/ μs
Gain bandwidth product	$R_L = 500 \Omega$	1.0			MHz
Open loop gain			n/a		dB
Junction temperature		-20		125	$^{\circ}C$
Overtemperature shutdown		140			$^{\circ}C$
Thermal resistance θ_{JA}	SOIC 8L package; still air, free convection		160		$^{\circ}C/W$

Status as of 09/2010: series production

A data sheet can be obtained at www.prema.com/pdf/pr2201.pdf

Dual Photo Diode PR5001 Low Dark current

- > Dual photo diode in small DFN package
- > Low dark current
- > High sensitivity
- > Good matching between diodes



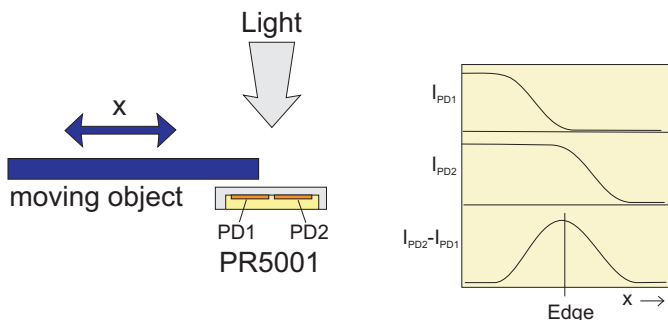
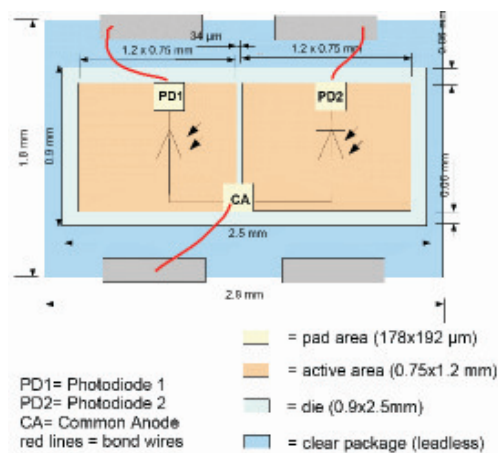
Dark current vs. reverse voltage

Application examples

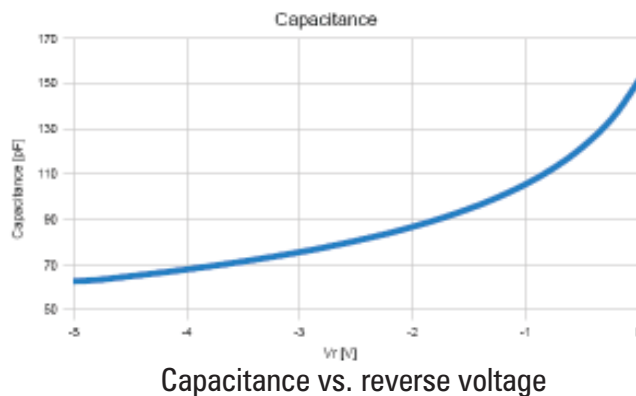
- > Laser beam alignment
- > Differential measurement of irradiance
- > Opto encoders
- > Position detection
- > Edge detection

PR5001 Dual Photo Diode

The PR5001 is a dual-element Si photo diode molded into a very small plastic leadless optical package. The photo diodes offer a very good symmetry, low dark current and high sensitivity.



PR5001 application: Edge detector

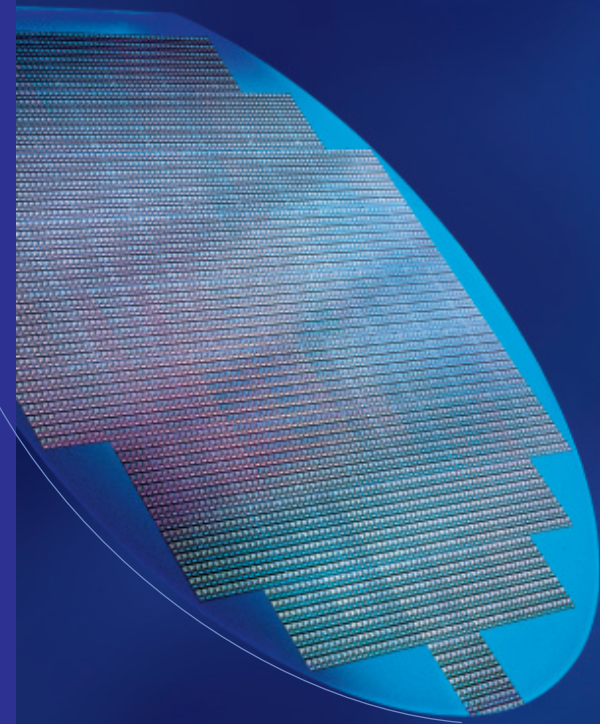


Capacitance vs. reverse voltage

Status as of 09/2010: series production

A data sheet can be obtained at www.prema.com/pdf/pr5001.pdf

Bright Ideas for Bright Products



PREMA Semiconductor - the independent wafer and IC supplier:

- Founded in 1970. Semiconductor division since 1977
- more than 30 years of experience in IC design and wafer processing
- Innovative bipolar and BiCMOS processes
- Located in Mainz/Germany, only 30 minutes away from Frankfurt airport
- Activities:
 - ASIC design, production and test
 - Foundry service
 - Standard ICs, ASSPs
- For more information on our ASIC activities see www.prema.com



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All data contained are subject to changes. Data of products in qualification are preliminary.

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