

APC Amplifier with Integrated Photodiode and Gain Adjust Capability

FEATURES

- Dual wavelength 650nm and 780nm
- 13 ns Settling Time to 2%
- 100 MHz Bandwidth at -3dB
- 10 mV Output Offset Voltage
- 25 μV/°C Output Offset Voltage Drift
- ± 6 dB External Gain Adjust
- Small 8-pin OPLGA package
- Power-down mode



APPLICATIONS

- CD-R, and CD-RW
- DVD+/-R, DVD+/-RW, and DVD-RAM

GENERAL DESCRIPTION

The SP8036 represents the next generation in Automatic Power Control (APC) amplifiers designed specifically for demanding pick-up head applications. With its integrated photo detector, the SP8036 monitors light intensity of the laser diode in CD-R, CD-RW, DVD+/-R, DVD+/-RW, and DVD-RAM assemblies and converts this light to an output voltage. The magnitude of this voltage signal corresponds to the laser power intensity and is subsequently fed back to the laser diode driver to control the laser output power.

The SP8036 on-chip photo detector transforms incident laser light into a proportional current, which is then converted to a voltage through a transimpedance amplifier. Adjustable gain is provided in the transimpedance amplifier by means of a gain control loop that is controlled by an external resistor. This external resistor is not a part of the signal path, which greatly reduces the effects of all parasitic capacitances and inductances on the flex cable at these pins. The signal is then buffered to provide reactive load drive capability.

The SP8036 achieves an unparalleled level of performance by combining excellent DC stability and low noise with outstanding AC performance. This level of performance is achieved using a proprietary fully complimentary BICMOS process with fully integrated, on-board photo detector.

The SP8036 is offered with a nominal sensitivity 4450 V/W and is packaged in a 3.0×3.5 mm, 8-lead OPLGA package. All input logic levels should not be left open at any time.

The SP8036 offers power-down capability with the new active-low chip enable pin, \overline{CE} . The chip operates normally when this pin is connected to GND and powers down when connected to Vcc.

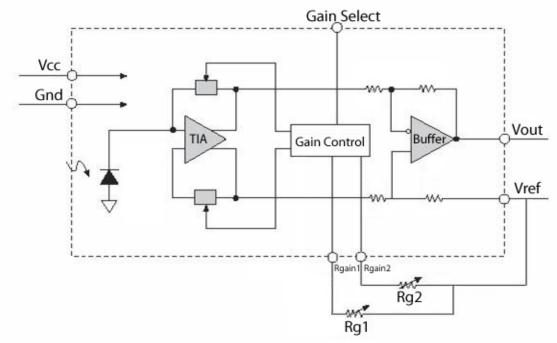


Figure 1: Functional Diagram

ABSOLUTE MAXIMUM RATINGS

These are stress ratings only and functional operation of the device at these ratings or any other above those indicated in the operation sections of the specifications below is not implied. Exposure to absolute maximum rating conditions for extended periods of time may affect reliability.

Supply Voltage (Vcc)	6.0V
All Other Pins	6.0V
Junction Temperature (T _J)	120°C
Storage Temperature	
Soldering Temperature	+235°C

RECOMMENDED OPERATING CONDITIONS

Supply Voltage (Vcc)	4.5V to 5.5V
Reference Voltage (VREF)	1.9V to 2.3V
Operating temperature	-20 to +85°C

THERMAL SPECIFICATIONS

8-pin OPLGA (3 x 3.5mm) Package Thermal Resistance.....90°C/W

ELECTRICAL/OPTICAL SPECIFICATIONS

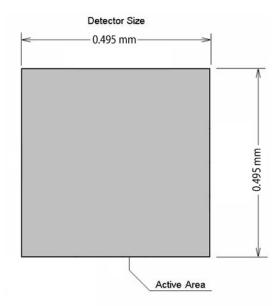
Unless otherwise noted: $4.5V \le Vcc \le 5.5V$, VREF =2.1V, output load: $R_L = 1k\Omega$ to VREF, $C_L = 20pF$ to GND, RGAIN = 400ohm, ambient temperature -20 $^{\circ}C \le TA \le +85 ^{\circ}C$

Parameter		Conditions	Min	Тур	Max	Units	
Supply Voltage			4.5	5	5.5	V	
Supply Current		TA = 25 °C, no signal		13	18	mA	
		-20 ≤TA ≤ +85 °C, no signal			25		
Voltage Referenc	e Range	RGAIN = 400ohm	1.9	2.1	2.3	V	
Output Offset Voltage		Referenced to VREF	-10		10	mV	
Outrout Officet Val	to see Duitt	RGAIN = 400ohm	-25		25	μV/°C	
Output Offset Vol	tage Driit	RGAIN = 950ohm	-50		50		
Power Supply Rejection Ratio		RGAIN = 400ohm, 4.5V ≤ Vcc ≤ 5.5V	55	73		I.D.	
(PSRR) *	•	RGAIN = 950ohm, 4.5V ≤ Vcc ≤ 5.5V	50	75		dB	
0 : 0 : 1 1 :		Logic level low			0.8	V	
Gain Switch Logic	C Levels	Logic level high	2.4				
Output Sensitivity		Any Select Mode. Laser Beam Diameter = 0.70mm, uniform density (RGAIN = 4000hm)		4450		V/W	
Input Optical Power required to produce a 1.5V output swing		Any Select Mode RGAIN = 400ohm		0.34		mW	
Photo Detector A	ctive Area			0.25		mm ²	
Output Sensitivity	Change vs. Vcc	RGAIN = 950ohm			5	%/V	
Output Sensitivity Change vs. Temperature		RGAIN = 950ohm			0.1	%/°C	
Output Noise (+6 dB)		1kHz ≤ BW ≤ 1MHz		0.14	2	mV	
		1kHz ≤ BW ≤ 100MHz		1.28	5		
Output Slew Rate)			190		V/µs	
Output Settling Ti	me to 2% of	-6dB		12.6	15		
Output Settling Time to 2% of finale value (1.5V step)		0dB		13.1	15	ns	
		+6dB		14.0	15		
Full Scale Output	Voltage Swing	Referenced to VREF	-1.5	-1.7		Vp-p	
Output Overshoot		Vout=1.5V step			5	%	
Bandwidth (-3dB)		RGAIN = 400ohm	70	100		MHz	
Gain Adjust	Vcc = 5.0V	150ohm≤Rgain≤950ohm	-6	-6 +6		dB	
Range at	Vcc = 4.5V	250ohm≤Rgain≤950ohm	-3		+6	QD.	

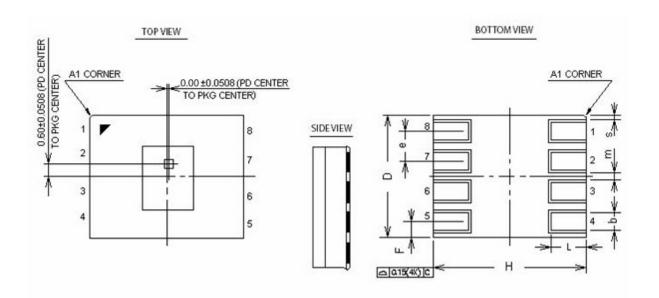
^{*} PSRR = 20log (ΔVcc/ΔVout), where Vout is the output voltage without signal (offset voltage)

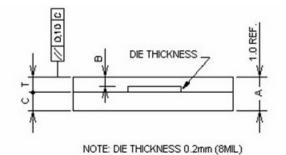
PIN ASSIGNMENTS

Pin#	Pin Name	Pin Function
1	Vref	Reference Voltage
2	Rgain1	Gain Adjust Resistor Rgain1 connection point
3	Rgain2	Gain Adjust Resistor Rgain2 connection point
4	ĈĒ	Active low Chip enable
5	GND	Power Ground
6	Vout	Output Voltage
7	Gain	Gain Switch Input. Low level or Open selects pin Rgain1, high level selects pin Rgain2
8	Vcc	Supply Voltage. Bypass to GND with ceramic capacitor 0.1µF



OPLGA 8-pin PACKAGE DIMENSIONS





08L 3.5 X	3.0 MM OPLGA	4
SYMBOLS DIMENSIONS IN MILLIMETERS		
MIN	NOM	MAX
0.90	1.00	1.10
0.19	_	0.25
0.30	0.40	0.50
-	0.56	_
3.40	3.50	3.60
2.90	3.00	3.10
_	0.75	_
0.50	0.60	0.70
_	0.45	_
0.28	0.38	0.48
0.075	1 —	_
0.10	_	
	DIMEN MIN 0.90 0.19 0.30 3.40 2.90 0.50 0.28 0.075	MIN NOM 0.90 1.00 0.19 — 0.30 0.40 — 0.56 3.40 3.50 2.90 3.00 — 0.75 0.50 0.60 — 0.45 0.28 0.38 0.075 —

Part number	Temperature range	Package Type
SP8036DG4	-20 + 85°C	8-pin OPLGA



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