SP8130

High Speed Differential APC Amplifier

FEATURES

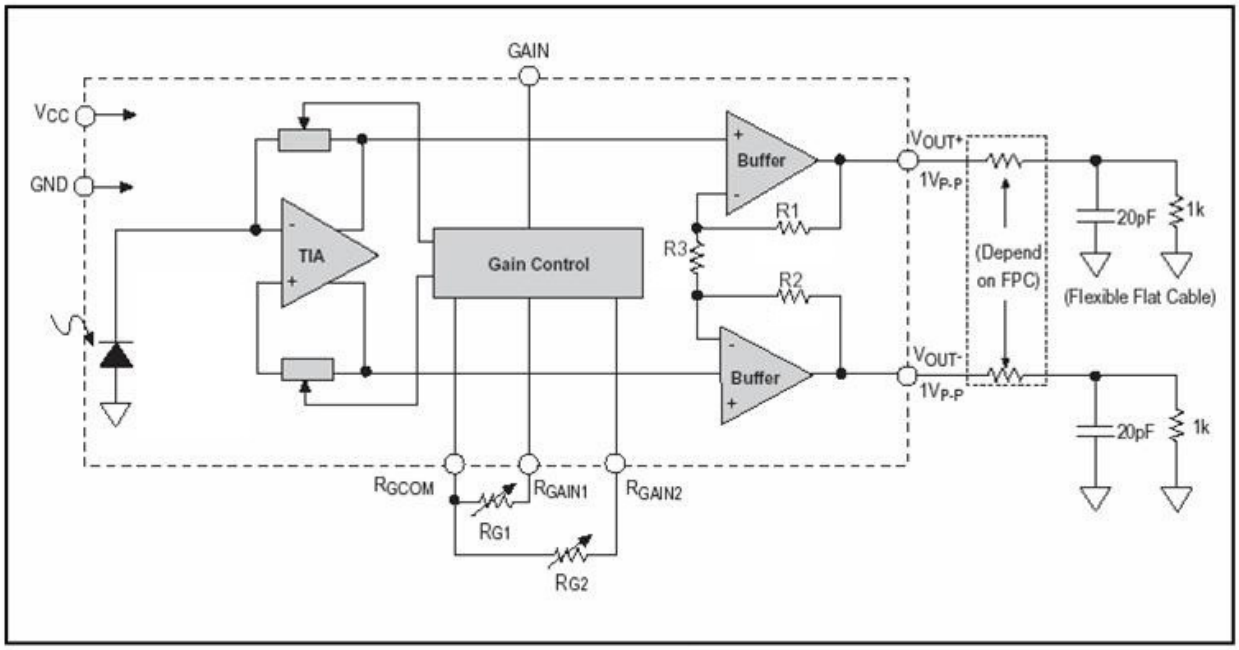
- Dual wavelength 650 and 780nm
- 160 MHz Bandwidth @ -6dB
- 600 V/µs Slew Rate
- 6 ns Settling Time
- 10 mV Differential Output Offset Voltage
- 30 uV/°C Output Offset Voltage Drift
- -6/+6 dB External Gain Adjust
- Small 8-pin OPLGA package

APPLICATIONs

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

GENERAL DESCRIPTION

The SP8130 is a high-speed, differential output APC amplifier that integrates the photodiode and adjustable gain block on one chip. Independent gain control allows individual adjustment for 780nm and 650nm wavelength operation, as found in CD/DVD optical storage drives. This allows the user to control the laser power of the system in high-speed DVD+/-RW, DVD-RAM and CD-RW systems. The wide 2V output swing also allows better system performance, through improved dynamic range.



SP8130 Functional Diagram and Typical Application

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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
Reference Voltage (Vs) ……..…… 6.0V
Output Voltage (Vout)……..…… Vcc
Junction Temperature (Tj)……...……120 °C
Storage Temperature……..…...-40°C to +100°C
Soldering Temperature……..……+245°C
(1x Reflow/MSL Level 6)*

** Based upon 500 temperature cycles as judgment criteria*

RECOMMENDED OPERATING CONDITIONS

Supply Voltage (Vcc)…….……...4.5V to 5.5V
Operating temperature……..……-20C to +85°C
CD Wavelength……..……..……780nm
DVD Wavelength……..……..……650nm

THERMAL SPECIFICATIONS

8-pin OPLGA (3 x 3.5mm) Package
Thermal Resistance…….…… 75 °C/W

SCHEMATIC DIAGRAM

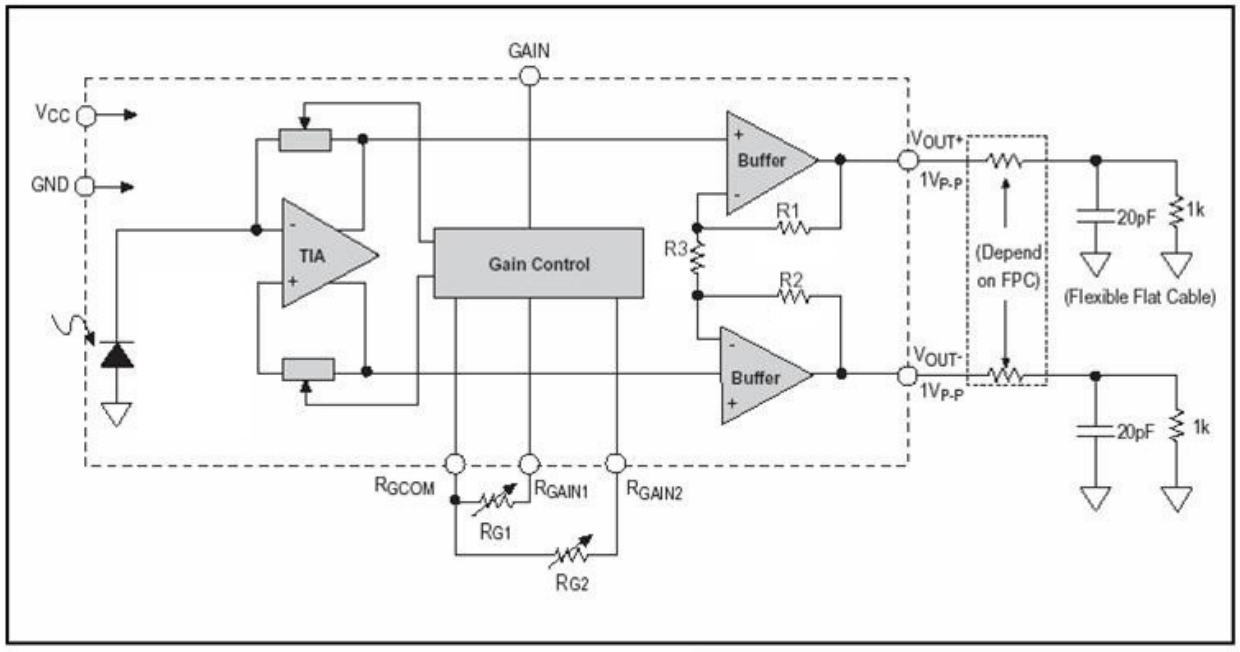

Figure 1. SP8130 Functional Diagram and Typical Application

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ELECTRICAL/OPTICAL SPECIFICATIONS

Unless otherwise noted: Vcc = 5V, output load: R_L = 1kΩ, C_L = 20pF, gain 0 dB, ambient temperature -20C ≤T_A ≤ +85 °C
Unless otherwise noted, electrical specifications apply to all gain modes.

Parameter	Condition	Min.	Typ.	Max	Unit
Supply Current	T_A = 25 °C, no signal		15		mA
	-20 ≤T_A ≤ +85 °C, no signal			20	
Output Common Mode Voltage	No signal	Vcc/2.2	Vcc/2	Vcc/1.8	V
Output Offset Voltage	Gain = 0dB, no signal	-10		10	mV
	Gain = +6dB, no signal	-15		15	
Output Offset Voltage Drift	Gain = 0dB, no signal	-30		30	µV/°C
	Gain = + 6dB, no signal	-45		45	
Power Supply Rejection Ratio (PSRR) *	Gain = 0dB, 4.5V ≤ Vcc ≤ 5.5V	-55	-80		dB
Gain Switch Input Voltage	Logic level low			0.8	V
	Logic level high	2			
Output Sensitivity	Gain = 0dB		5700		V/W
Input Optical Power required to produce a 2V differential output swing	0.28mm laser beam diameter, uniform density, Gain = 0dB		350		µW
Photo Detector Active Area			0.25		mm^2
Output Sensitivity Change vs. Vcc	All gains		1	4	%/V
Output Sensitivity Change vs. Temperature	All gains		0.05	0.1	%/°C
Output Noise, BW= 100MHz	Gain = 0dB		1.6	2	mV rms
	Gain = +6dB		2.6	5	
Output Slew Rate		400	600		V/µs
Output Setting Time to *2%* of final value	Gain = -6dB, 2Vpp step, f=10MHz		6.2	7	ns
	Gain = -0dB, 2Vpp step, f=10MHz		7.0	8	
	Gain = +6dB, 2Vpp step, f=10MHz		7.1	9	
Full Scale Output Voltage Swing		2			V p-p
Output Overshoot	All gains		0.5	2	%
Bandwidth	Gain = -6dB, -3dB level		160		MHz
	Gain = 0dB, -3dB level		140		
	Gain = +6dB, -3dB level		120		
Gain Adjust Range		-6		+8	dB

*) PSRR = 20log (ΔVcc/ΔVOUT)
**) Gain Linearity = (Gain2 – Gain 1)/Gain 1, where Gain = VOUT/Pin. This test is done with current injection at the wafer level.

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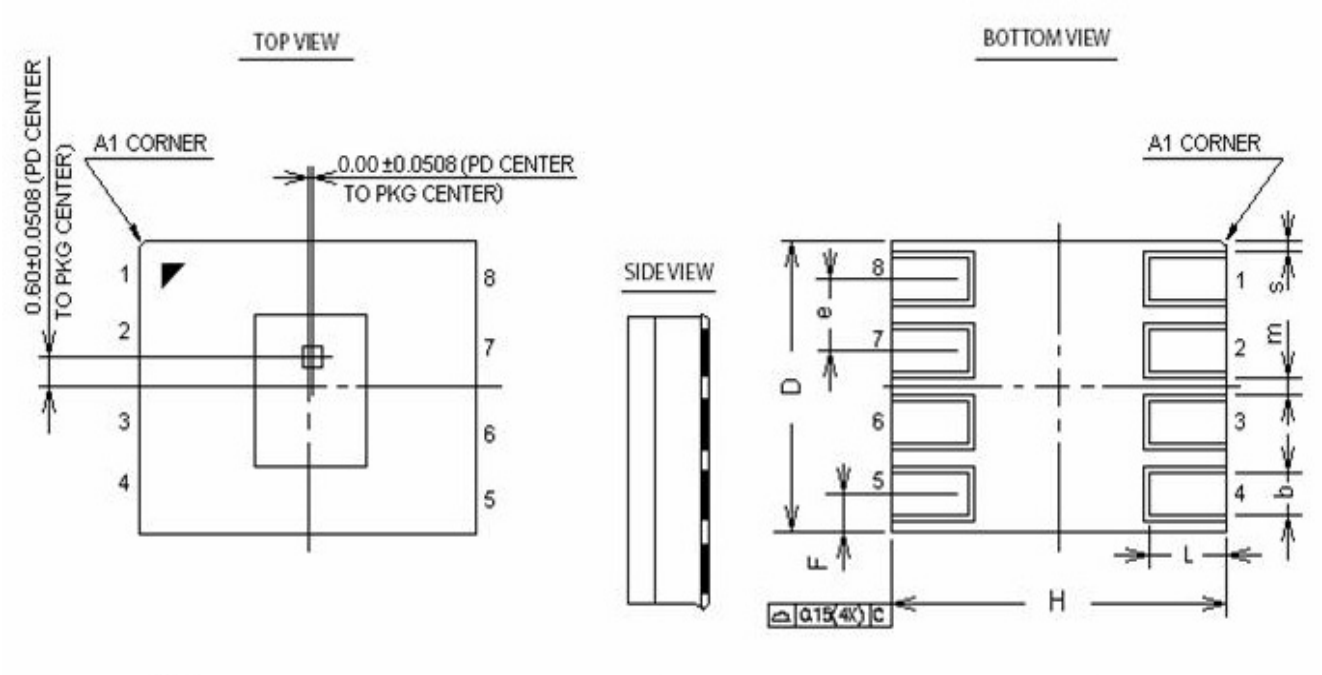
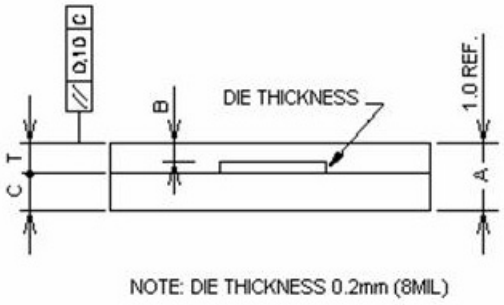
PIN ASSIGNMENTS

Pin #	Pin Name	Pin Function
1	Gain	Gain Switch Input. Low level selects RG1, high level selects RG2
2	RG1	Gain Adjust 1
3	RGCOM	Common connection point for RG1 and RG2
4	RG2	Gain Adjust 2
5	GND	Power Ground
6	VOUT (–)	Output Voltage Negative Swing
7	VOUT(+)	Output Voltage Positive Swing
8	Vcc	Supply Voltage. Bypass to GND with ceramic capacitor 0.1µF

OPLGA 8-pin PACKAGE DIMENSIONS





NOTE: DIE THICKNESS 0.2mm (8MIL)

08L 3.5 X 3.0 MM OPLGA			
SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A	0.90	1.00	1.10
B	0.19	—	0.25
b	0.30	0.40	0.50
C	—	0.56	—
H	3.40	3.50	3.60
D	2.90	3.00	3.10
e	—	0.75	—
L	0.50	0.60	0.70
T	—	0.45	—
F	0.28	0.38	0.48
s	0.075	—	—
m	0.10	—	—
SIPEX Pkg Sign-off Date/Rev.:		JL 04/12/06 Rev. A	

Clear Mold Compound Characteristics:
Clear Mold Material : NT330HQ
Refractive index : 1.57

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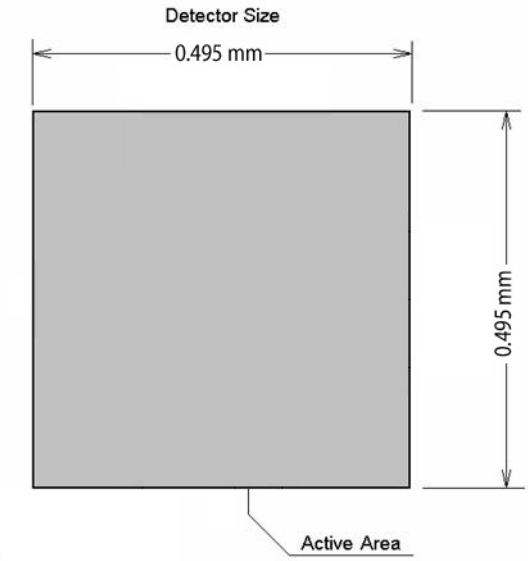
PHOTO DETECTOR PATTERN



Tolerance of PD position:
X, Y: +/- 0.20mm
Angle: 0° +/- 1°
Die tilt: 0° +/- 2°

ORDERING INFORMATION

Part Number	Temperature range	Package Type
SP8130DG4	-20C + 85^{0}C	8-pin OPLGA

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