

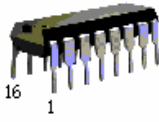
The PJ2109 includes four independent op-amp and fixed Voltage Reference. This device is offering space and cost saving in many applications like power supply management or data acquisition systems.

The PJ2109 can operate at supply Voltages as low as 3.0V or as high as 32V with very low quiescent currents and eliminates the necessity for external biasing components in many applications. The output voltage range also includes the negative power supply voltage.

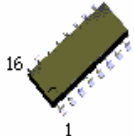
**FEATURES**

- Low input offset voltage 2mV.
- Low supply current:800uA/op (@Vcc=5V)
- Medium Bandwidth (unity gain):0.9MHz
- Large output voltage range includes Ground
- Wide power supply range:3 to 32V
- Fixed output voltage reference 2.5V
- Voltage precision:1%
- Sink current capability:1 to 200mA
- Typical output impedance:0.2Ω

DIP-16



SOP-16



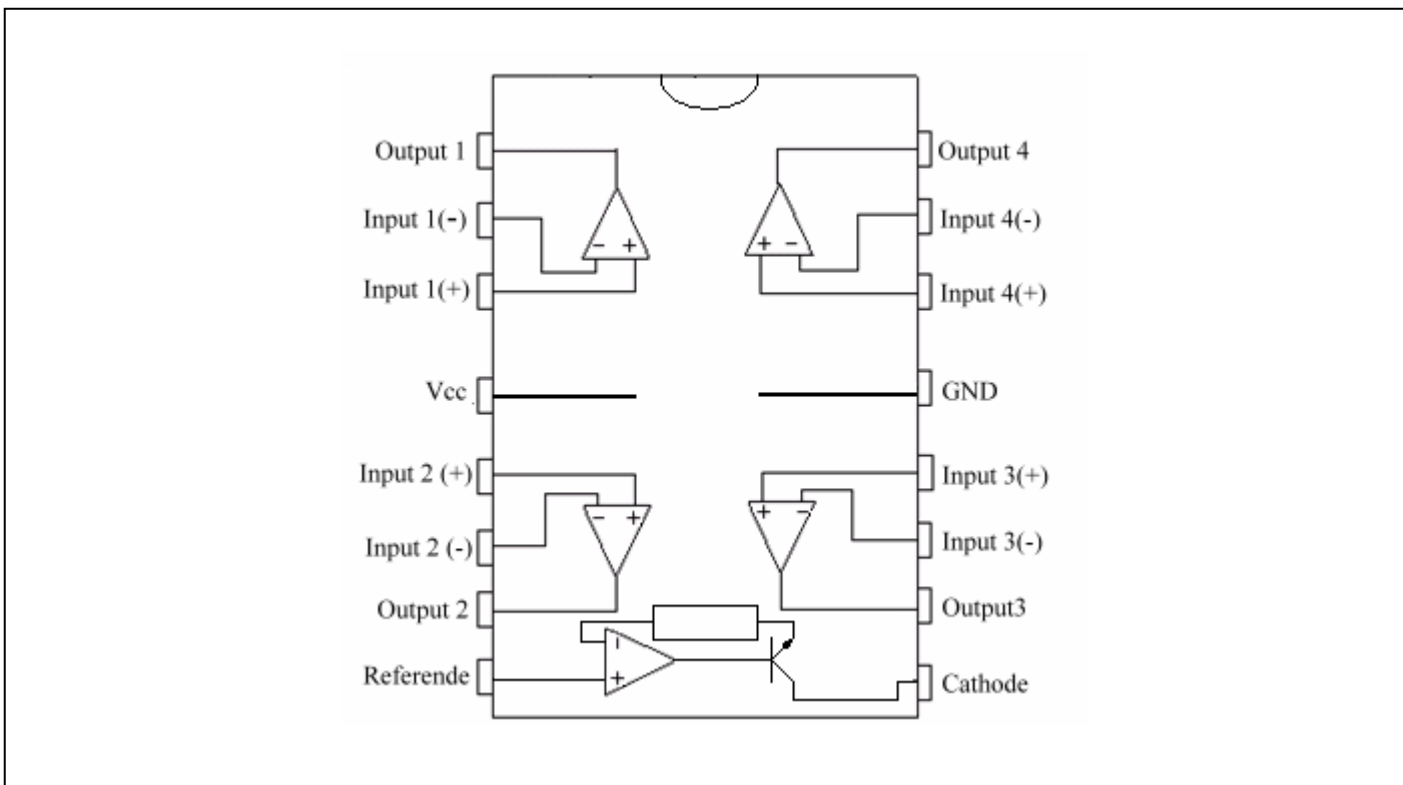
Pin:1.Output 1  
 2.Input 1(-)  
 3.Input 1(+)  
 4.Vcc  
 5.Input 2(+)  
 6.Input 2(-)  
 7.Output 2  
 8.Reference

9.Cathode  
 10.Input 3  
 11. Input 3(-)  
 12 Input 3(+)  
 13. GND  
 14. Input4(+)  
 15. Input4 (-)  
 16. Output 4

**ORDERING INFORMATION**

Device	Operating Temperature	Package
PJ2109CD	-20 ~ +85°C	DIP16
PJ2109CS		SOP16

**BLOCK DIAGRAM**



**ELECTRICAL CHARACTERISTICS** ( $V_{CC}=5.0V$ ,  $V_{EE}=GND$ ,  $T_A=25^\circ C$  unless otherwise noted.)

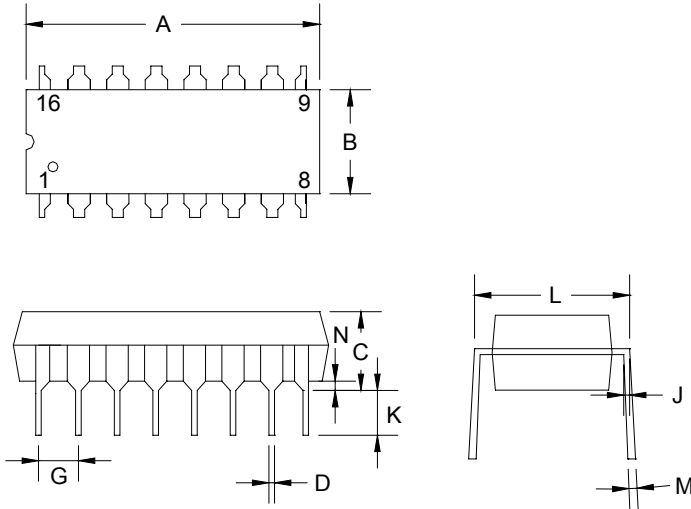
Characteristics	Symbol	PJ2109			Unit
		Min	Typ	Max	
<b>Operaoion Amplifier</b>					
Input Offset Voltage $V_{CC}=5.0V$ to $30V$ $V_{ICR}=0V$ to $V_{CC}-0.7V$ , $V_o=1.4V$ , $R_s=0\Omega$ $T_A=25^\circ C$ $T_A=T_{high}$ to $T_{low}$ (Note 1)	$V_{IO}$	- -	2.0 -	7.0 9.0	mV
Average Temperature Coefficient of Input Offset Voltage $T_A=T_{high}$ to $T_{low}$ (Note 1)	$\Delta I_{IO} / \Delta T$	-	7.0	-	$\mu V / ^\circ C$
Input Offset Current $T_A=T_{high}$ to $T_{low}$ (Note 1)	$I_{IO}$	- -	5.0 -	50 150	nA
Average Temperature Coefficient of Input Offset Voltage $T_A=T_{high}$ to $T_{low}$ (Note 1)	$\Delta I_{IO} / \Delta T$	-	10	-	$pA / ^\circ C$
Input Bias Current $T_A=T_{high}$ to $T_{low}$ (Note 1)	$I_{IB}$	- -	-90 -	-250 -500	nA
Input Common Mode Voltage Range (Note 2) $V_{CC}=30V$ $V_{CC}=30V$ , $T_A=T_{high}$ to $T_{low}$	$V_{ICR}$	0 0	- -	28.3 28	V
Differential Input Voltage Range	$V_{IDR}$	-	-	$V_{CC}$	V
Large Signal Open-Loop Voltage Gain $R_L=2.0K$ , $V_{CC}=15V$ , for Large $V_o$ Swing $T_A=T_{high}$ to $T_{low}$ (Note 1)	$A_{VOL}$	25 15	100 -	- -	V/mV
Channel Separation $10KHz \leq f \leq 20KHz$ , Input Referenced	CS	-	-120	-	dB
Common Mode Rejection $R_s \leq 10K \Omega$	CMR	65	70	-	dB
Power Supply Rejection	PSR	65	100	-	dB
Output Voltage - High Limit ( $T_A=T_{high}$ to $T_{low}$ ) (Note 1) $V_{CC}=5.0V$ , $R_L=10K$ , $T_A=25^\circ C$ $V_{CC}=30V$ , $R_L=2.0K$ $V_{CC}=30V$ , $R_L=10K$	$V_{OH}$	3.3 26 27	3.5 - 28	- - -	V
Output Voltage-Low Limit $V_{CC}=5.0V$ , $R_L=10K$ , $T_A=T_{high}$ to $T_{low}$ (Note 1)	$V_{OL}$	-	5.0	20	mV
Output Source Current ( $V_{ID}=+1.0V$ , $V_{CC}=15V$ ) $T_A=25^\circ C$ $T_A=T_{high}$ to $T_{low}$ (Note 1)	$I_{O^+}$	20 10	40 20	- -	mA
Output Sink Current ( $V_{ID}=-1.0V$ , $V_{CC}=15V$ ) $T_A=25^\circ C$ $T_A=T_{high}$ to $T_{low}$ (Note 1) ( $V_{ID}=-1.0V$ , $V_{CC}=200mV$ , $T_A=25^\circ C$ )	$I_{O^-}$	10 5.0 12	20 8.0 50	- - -	mA  $\mu A$
Output Short Circuit Ground (Note 2)	Isc	-	40	60	mA
Power Supply Current ( $T_A=T_{high}$ to $T_{low}$ ) (Note 1) $V_{CC}=30V$ (26V for LM2902), $V_o=0V$ , $R_L=\infty$ $V_{CC}=5.0V$ , $V_o=0V$ , $R_L=\infty$	$I_{cc}$	- -	- -	3.0 1.2	mA

**VOLTAGE REFERENCE**

Characteristic	Symbol	PJ2109			Unit
		Min	Typ	Max	
<b>Operaion Amplifier</b>					
Reference Input Voltage (Figure 1) $V_{KA} = V_{ref}$ , $I_K = 10 \text{ mA}$ , $T_A = +25^\circ\text{C}$ $T_A = T_{low}$ to $T_{high}$ (Note 1) PJ2109	Vref	2.475	2.495	2.525	
Reference Input Voltage Deviation Over Temperature Range (Figure 1, Note 1,2,4) $V_{KA} = V_{ref}$ , $I_K = 10 \text{ mA}$	$\Delta V_{ref}$	--	3.0	17	mV
Minimum Cathode Current for Regulation $V_{KA} = V_{ref}$ (Figure 1)	$I_{min}$	--	0.15	0.3	mA
Off-State Cathode Current (Figure 3) $V_{KA} = 36 \text{ V}$ , $V_{ref} = 0\text{V}$	$I_{off}$	--	2.6	1000	nA
Dynamic Impedance (Figure 1, Note 3) $V_{KA} = V_{ref}$ , $\Delta I_K = 1.0 \text{ mA}$ to $100 \text{ mA}$ , $f \leq 1.0 \text{ kHz}$	$ Z_{ke} $	--	0.22	0.5	$\Omega$

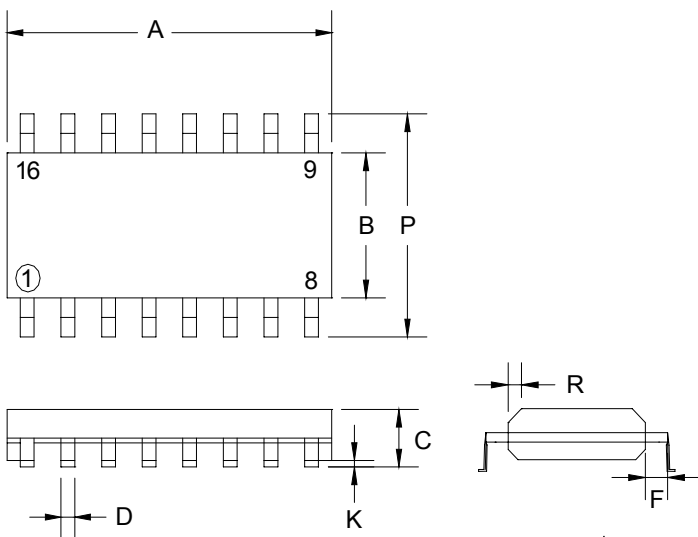
- Note: 1. Short circuits from the output to Vcc can cause excessive heating and eventual destruction . Destructive dissipation can result from simultaneous shorts on all amplifiers.  
 2. The input common mode voltage or either input signal voltage should not be allowed to go negative by more than 0.3V. The upper end of the common mode voltage range is Vcc-1.7V.

DIP-16 Unit : mm



DIP-16 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	1.780	18.050	0.701	0.710
B	6.250	6.450	0.292	0.299
C	2.350	2.650	0.093	0.104
D	0.350	0.490	0.014	0.019
G	1.27BSC		0.05BSC	
J	0.250	0.320	0.010	0.012
K	0.100	0.250	0.004	0.009
L	7.750	8.000	0.305	0.315
M	0°	10°	0°	10°
N	0.390	1.010	0.015	0.039

SOP-16 Unit : mm



SOP-16 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.800	10.000	0.368	0.393
B	7.400	7.600	0.292	0.299
C	2.350	2.650	0.093	0.104
D	0.350	0.490	0.014	0.019
F	0.500	0.900	0.020	0.035
G	1.27BSC		0.05BSC	
K	0.100	0.250	0.004	0.009
M	0	7	0	7
P	10.05	10.55	0.395	0.415
R	0.250	0.75	0.010	0.029