

Preliminary Data Sheet

QUDA OPERATIONAL AMPLIFIER AND PROGRAMMABLE VOLTAGE REFERENCE

The PJ2109 is a monolithic IC that includes four op-amp and an adjustable shunt voltage reference. This device is offering space and cost saving in many applications like power supply management or data acquisition systems.

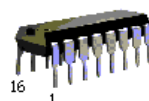
FEATURES

- Low Supply Current: 375 μ A/op (@V_{cc}=5V).
- Low Input Bias Current:20nA
- Medium Speed:0.9MHz
- Low Input Offset Voltage:0.5mV Typ For PJ2109
- Wide Power Supply Range:±1.5V To ±15V
- Adjustable Output Voltage: V_{ref} To 36V
- 0.4% And 1% Voltage Precision
- Sink Current Capability:1 To 100mA
- Typical Output Impedance:0.2 Ω

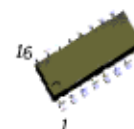
APPLICATIONS

- Battery protection
- Load switch
- Power management

DIP-16



SOP-16



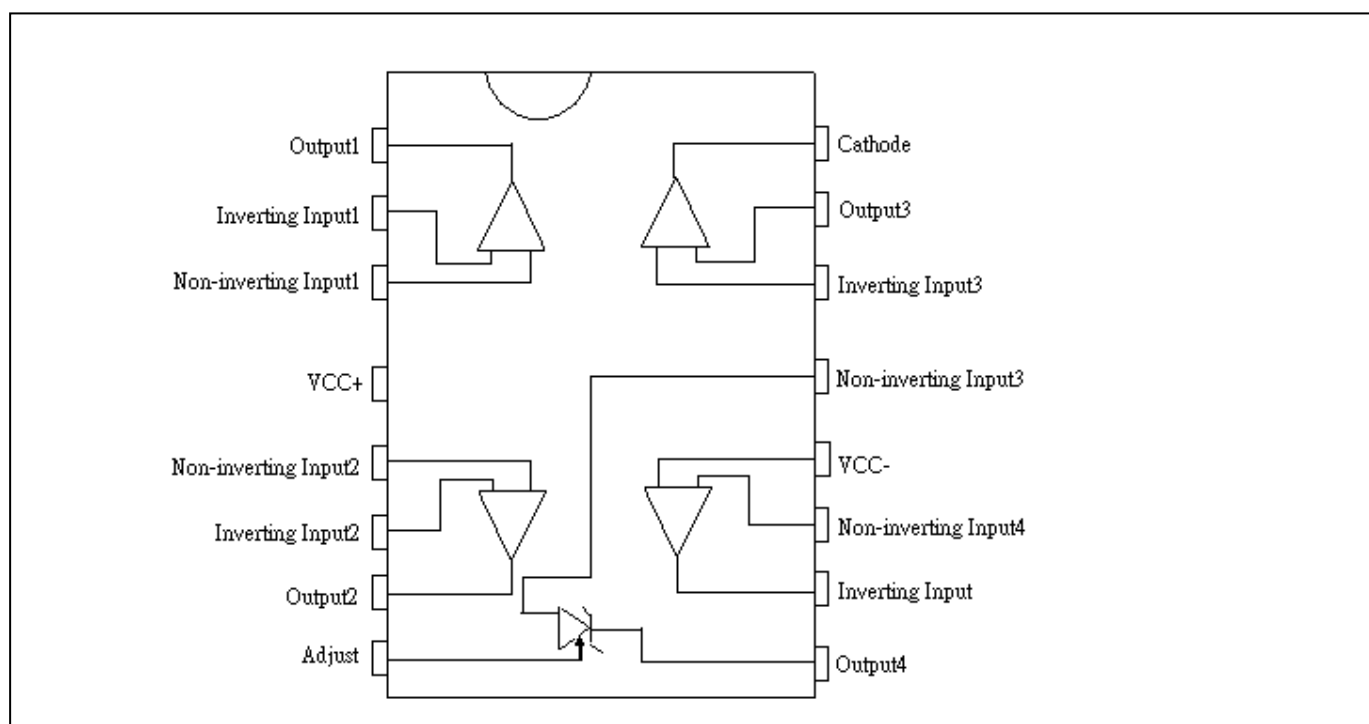
Pin: 1.Output1
2. Inverting Input1
3. Non-inverting Input1
4. V_{CC}+
5. Non-inverting Input2
6. Inverting Input2
7. Output2
8. Adjust

9.Cathode
10.Output3
11. Inverting Input3
12.Non-inverting Input3
13.V_{CC}-
14.Non-inverting Input4
15.Inverting Input
16.Output4

ORDERING INFORMATION

Device	Operating Temperature	Package
PJ2109CD	0 TO 75°C	DIP16
PJ2109CS		SOP16

BLOCK DIAGRAM



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MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Supply Voltage	V_{cc}	36	V
Differential Input Voltage	I_{id}	36	V
Input Voltage	V_i	-0.3 to 36	V
Output short-circuit Duration		Infinite	
Operating Free-Air Temperature Range	I_{oper}	-55 to +125	°C
Maximum Junction Temperature	T_j	150	°C
Thermal Resistant Junction to Ambient(SO package)	T_{thja}	150	°C/W

ELECTRICAL CHARACTERISTICS($V_{cc}^+=5V$, $V_{cc}^-=0V$, $T_{amb}=25^{\circ}C$ (unless otherwise specified))

CHARACTERISTICS	SYMBOL	CONDITIONS	Min.	Typ.	Max.	Unit
Total Supply Current, excluding current in the Voltage Reference	I_{cc}	$V_{cc}^+=5V$, no load $T_{min.}<T_{amb.}<T_{max.}$		1.4	2.4	mA
		$V_{cc}^+=30V$, no load $T_{min.}<T_{amb.}<T_{max.}$			4	

Preliminary Data Sheet

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ELECTRICAL CHARACTERISTICS($V_{CC}^{+}=5V$, V_{CC}^{-} =Ground, $V_O=1.4V$, $T_{amb}=25^{\circ}C$ (unless otherwise specified))

CHARACTERISTICS	SYMBOL	CONDITIONS	Min.	Typ.	Max.	Unit
Large Signal Voltage Gain	A_{vd}	$V_{CC}=15V$, $R_L=2K$ $V_O=1.4V$ to $11.4V$	50	100		V/mV
Supply Voltage Rejection Ratio	SVR	$V_{CC}=5V$ to $3V$	65	100		dB
Common Mode Rejection Ratio	CMR		70	85		dB
Input Voltage Mode Voltage Range	V_{icm}	$V_{CC}=+30V$ see note ¹⁾	0		$V_{CC}^{+}-1.5$	V
Input Offset Voltage	V_{io}			1	5	mV
Input Offset Voltage Drift	ΔV_{io}			7		$\mu V/^{\circ}C$
Input Offset Current	I_{io}			2	30	nA
Input Bias Current	I_{ib}			20	150	nA
Output Current Source	I_{source}	$V_O=2V$, $V_{CC}=+15V$, $V_{id}=+1V$	20	40		mA
Output Short Circuit to Ground	I_O	$V_{CC}=+15V$		40	60	mA
Output Current Sink	I_{sink}	$V_{id}=-1V$, $V_{CC}=+15V$, $V_O=+2V$	10	20		mA
Low Level Output Voltage	V_{OL}	$R_L=10K$		5	20	mV
High Level Output Voltage	V_{OH}	$R_L=10K$, $V_{CC}^{+}=30V$	27	28		V
Channel Separation	C_S	$1kHz < f < 20kHz$		120		dB
Gain Bandwith Product	GBP	$V_{CC}=30V$, $R_L=2K$, $C_L=100Pf$ $f=100kHz$, $V_{in}=10mV$	0.5	0.9		MHz
Slew Rate at Unity Gain	SR	$V_i=0.5$ to $3V$, $V_{CC}=15V$ $R_L=2K\Omega$, $C_L=100Pf$, unity gain	0.1	0.3		V/ μs
Equivalent	e_n	$f=1kHz$, $V_{CC}=30V$, $R_S=100\Omega$		50		$\frac{nV}{\sqrt{Hz}}$
Total Harmonic Distortion	THD	$f=1kHz$, $A_V=20dB$, $R_L=2$, $V_{CC}=30V$ $C_L=100pF$, $V_O=2V_{pp}$		0.02		%
Cathode Current	I_K		1		100	mA
Reference Input Voltage	V_{ref}		2.475	2.5	2.525	V
Reference Input Voltage Deviation Over Temperature Range	ΔV_{ref}	$V_{KA}=V_{ref}$, $I_K=10mA$		7	30	mV
Ratio of Change in Reference Input Voltage to Change in Cathode to Anode Voltage	$\Delta V_{ref}/\Delta V_{KA}$	$I_K=10mA$, $\Delta V_{KA}=36V$ to $3V$	-2	-1.1		mV/V

1. The input common-mode voltage of 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 V_{CC}^{+} . But either of both inputs can go to +36V without damage.

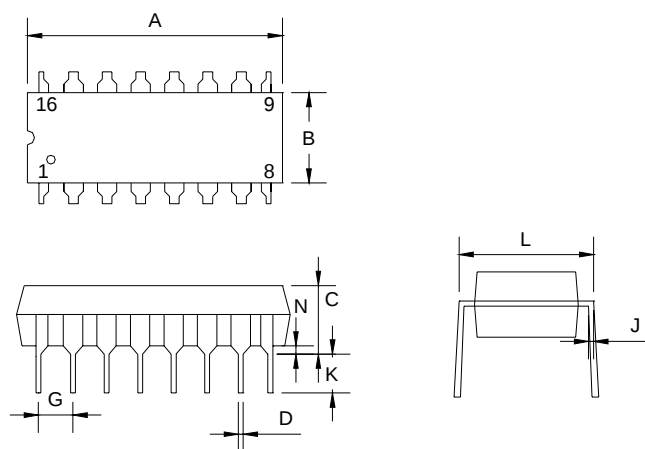
ELECTRICAL CHARACTERISTICS($V_{cc}^{+}=5V$, V_{cc}^{-} =Ground, $V_o=1.4V$, $T_{amb}=25^{\circ}C$ (unless otherwise specified))

CHARACTERISTICS	SYMBOL	CONDITIONS	Min.	Typ.	Max.	Unit
Minimum Cathode Current for Regulation	I_{min}	$V_{KA}=V_{ref}$		0.5	1	mA
Off-State Cathode Current	I_{off}			180	500	nA
Reference Input Current	I_{ref}	$I_K=10mA$		1.5	2.5	μA
Reference Input Current Deviation Over T^o Range	ΔI_{ref}			0.8	1.2	μA
Dynamic Impedance-note1	$ Z_{KA} $	$V_{KA}=V_{ref}$, $\Delta I_K=1$ to $100mA$ $f<1kHz$		0.2	0.5	Ω

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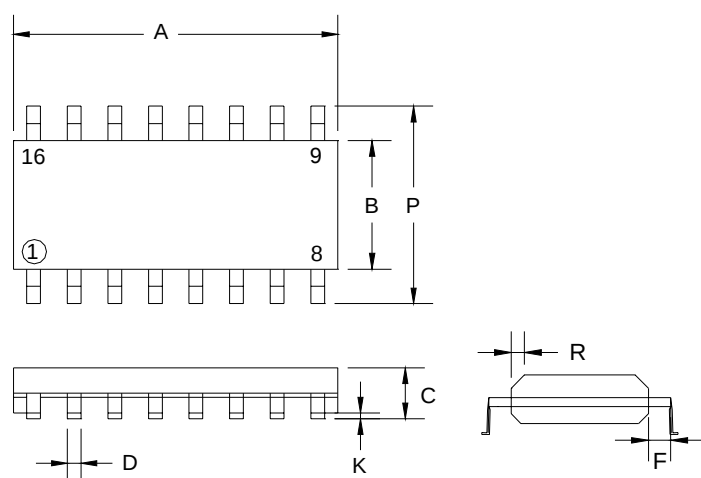
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DIP-16 Unit : mm



DIP-16 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	17.80	18.05	0.701	0.710
B	6.25	6.45	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
G	1.27BSC		0.05BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
L	7.75	8.00	0.305	0.315
N	0.39	1.01	0.015	0.039

SOP-16 Unit : mm



SOP-16 DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	9.8	10.00	0.386	0.393
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27BSC		0.05BSC	
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029