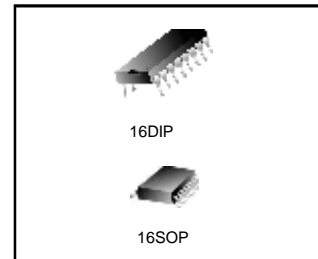


DESCRIPTION

The IP102/A is a monolithic IC that includes two operational amplifiers, two comparators and an adjustable shunt regulator. This device is offering space and cost saving in many applications like power supply management or data acquisition systems.



FEATURES

Operational Amplifiers

- Low Supply Current : 200uA/amp
- Medium Speed : 1.5MHz
- Low Level Output Voltage Close to VEE : 0.1V Typ.

Comparators

- Low Supply Current : 200uA/amp (Vcc = 5V)
- Low Output Saturation Voltage 0.1V (Io = 4mA)

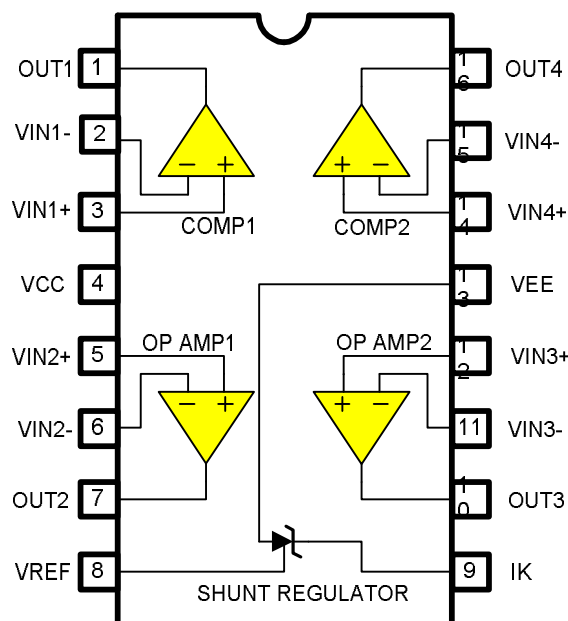
Adjustable Shunt Regulator

- Adjustable Output Voltage : Vref to 18V
- Sink Current Capability : 0.5 to 150mA
- 1% Voltage Precision
- Latch-up Immunity

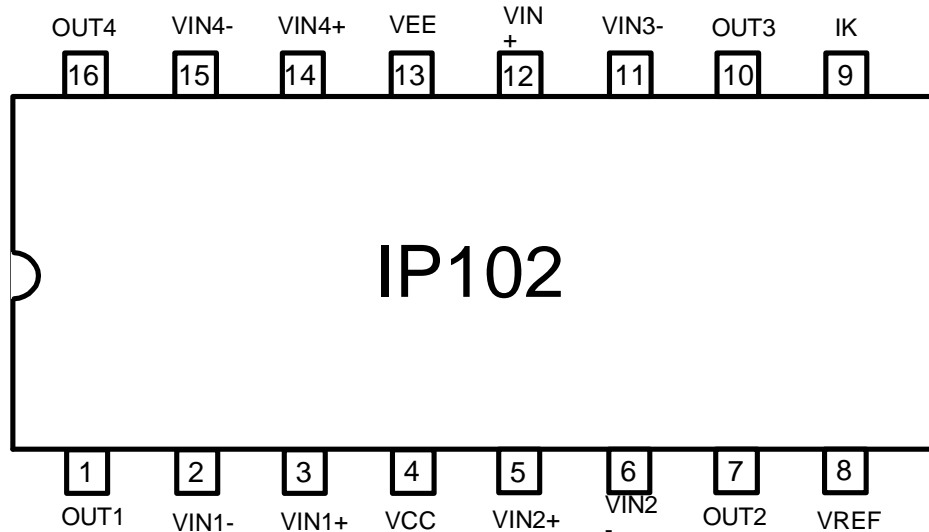
ORDERING INFORMATION

Device	Package	Operating Temp
IP102A	16DIP	-40°C ~ +85°C
IP102A	16SOP	

BLOCK DIAGRAM



PIN CONNECTIONS



PIN DESCRIPTIONS

NO	SYMBOL	I/O	DESCRIPTION
1	OUT1	O	Comparator 1 Output
2	VIN1-	I	Comparator 1 Inverting Input
3	VIN1+	I	Comparator 1 Non-Inverting Input
4	VCC	-	Positive Supply Voltage
5	VIN2+	I	OP-Amp 1 Non-Inverting Input
6	VIN2-	I	OP-Amp 1 Inverting Input
7	OUT2	O	OP-Amp 1 Output
8	VREF	-	Adjustable Shunt Regulator Voltage Reference
9	IK	I	Adjustable Shunt Regulator Cathode
10	OUT3	O	OP-Amp 2 Output
11	VIN3-	I	OP-Amp 2 Inverting Input
12	VIN3+	I	OP-Amp 2 Non-Inverting Input
13	VEE	-	Negative Supply Voltage
14	VIN4+	I	Comparator 2 Non-Inverting Input
15	VIN4-	I	Comparator 2 Inverting Input
16	OUT4	O	Comparator 2 Output

ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V _{cc}	18	V
Operating temperature	T _{opr}	-40 ~ +85	°C
Storage temperature	T _{stg}	-65 ~ 150	°C

ELECTRICAL CHARACTERISTICS

T_a = 25°C, V_{cc} = 5V, V_{EE} = GND (unless otherwise specified.)

TOTAL SUPPLY VOLTAGE SECTION

CHARACTERISTICS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Total Supply Current	I _{cc}	V _{ee} = 0V, No Load		0.8	1.5	mA

Operational Amplifiers

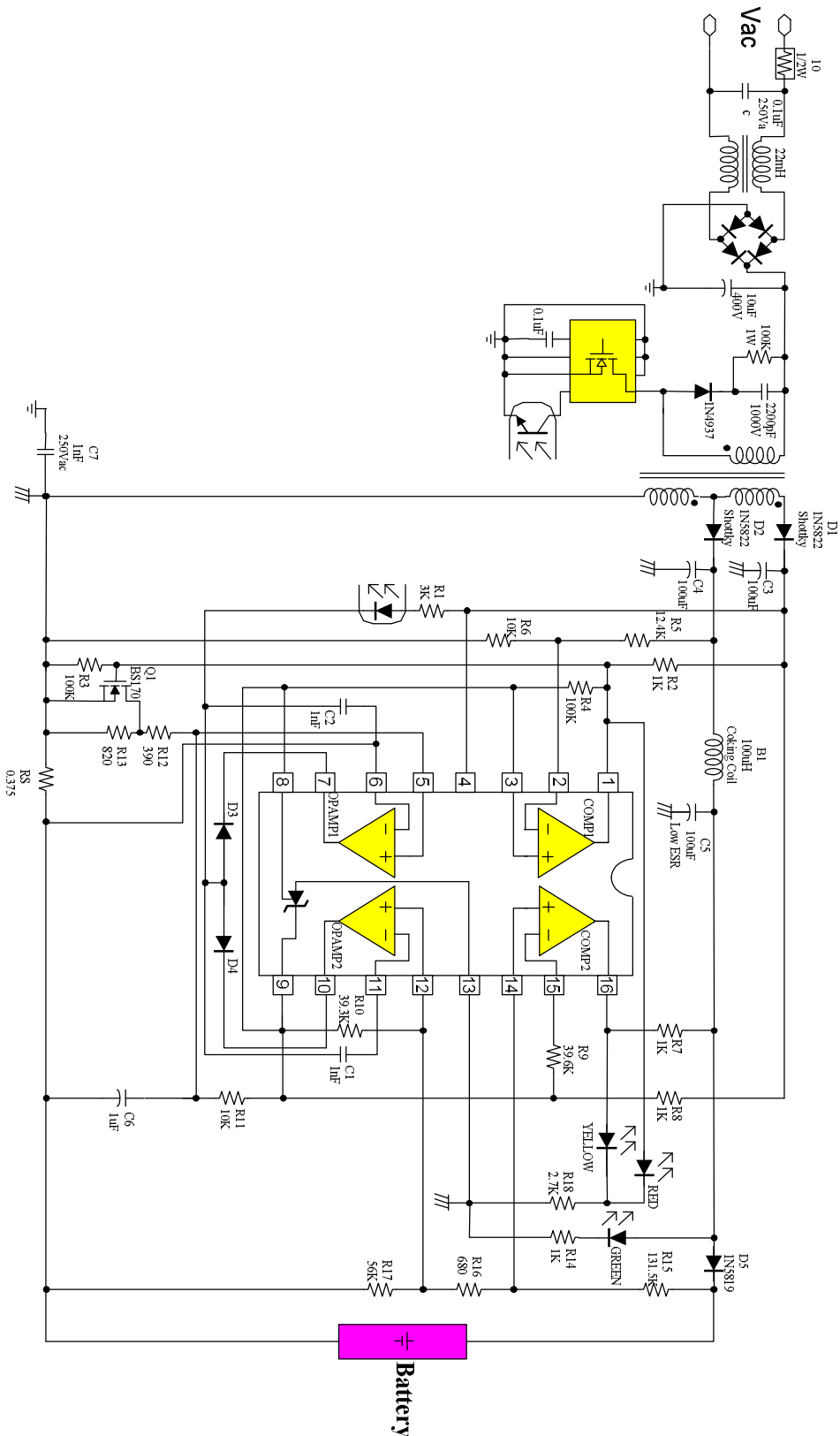
Input Offset Voltage	V _{io}			1	4.5	mV
Input Offset Current	I _{io}				50	nA
Input Bias Current	I _{ib}			50	150	nA
Large Signal Voltage Gain	A _{vd}	V _{cc} =15V, V _o =5~10V, R _{load} =10K	60	100		dB
Supply Voltage Rejection Ratio	SVRR	V _{cc} = 5V to 15V	65	100		dB
Common Mode Rejection Ratio	CMRR	V _{cc} =15V, V _{icm} =0~(V _{cc})-1.8V	70	90		dB
Output Source Current	I _{source}	V _o =2.5V, V _{id} =+-1V	3	6		mA
Output Sink Current	I _{sink}	V _o =2.5V, V _{id} =+-1V	3	6		mA
Phase Margin	PM	R _{load} =10K, C _{load} =100pF		55		Degree
Output Voltage High	V _{oh}	V _{cc} =15V, R _{load} =10K	12	13		V
Output Voltage Low	V _{ol}	R _{load} =10K		100	150	mV
Slew Rate	SR	V _i =10V, V _{cc} =12V, R _{load} =10K, C _{load} =100pF	0.5	0.75		V/us
Gain Bandwidth	GB	R _{load} =10K, C _{load} =100pF, f=100khz	1.0	1.5		MHz
Total Harmonic Distortion	THD			0.05		%

ELECTRICAL CHARACTERISTICS

Ta = 25°C, Vcc = 5V, VEE=GND (unless otherwise specified.)

Comparators						
CHARACTERISTICS	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	Vio				5	mV
Input Offset Current	Iio				50	nA
Input Bias Current	Iib				200	nA
High Level Output Current	Ioh	Vid = +1V, Vcc=Vo=15V		0.1	1	uA
Large Signal Voltage Gain	Avd	Vcc+=15V, Rload =15K, Vo=1V to 11V		200		V/mV
Low Level Output Voltage	Vol	Vid = -1V, Isc = 4mA		100	400	mV
Output Sink Current	Isc	Vid = -1V, Vo = 1.5V	6	16		mA
Input Common Mode Voltage Range	Vicm		0		(Vcc) - 1.5	V
Differential Input Voltage	Vid				Vcc	V
Adjustable Shunt Regulator						
Cathode to Anode Voltage	Vka		Vref		18	V
Cathode Current	Ik		0.5		150	mA
Reference Input Voltage	Vref	IP102	2.475	2.5	2.525	V
Reference Input Voltage Deviation	dVref	Vka=Vref, Ik=10mA -40°C < Ta < 85°C		7	30	mV
Load Regulation	Rload	Vka=Vref, Ik=10mA~100mA		20	50	mV
Minimum Cathode Current for Regulation	Imin	Vka = Vref		0.2	0.5	mA
Off-State Cathode Current	Ioff	Vka=18V, Vref=0V		0.1	1	uA

TYPICAL APPLICATION



ELECTRICAL DIAGRAMS

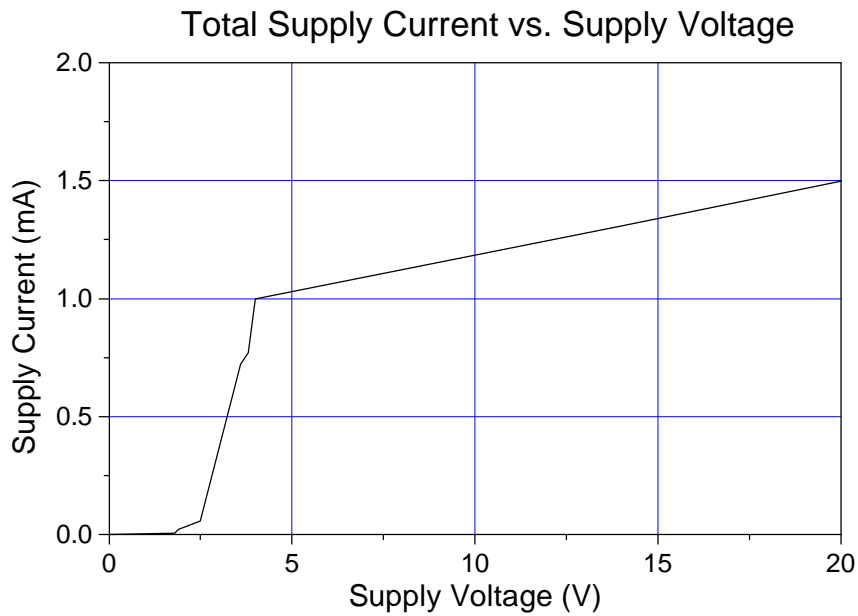


Fig.1 : Total Supply Current vs. Supply Voltage

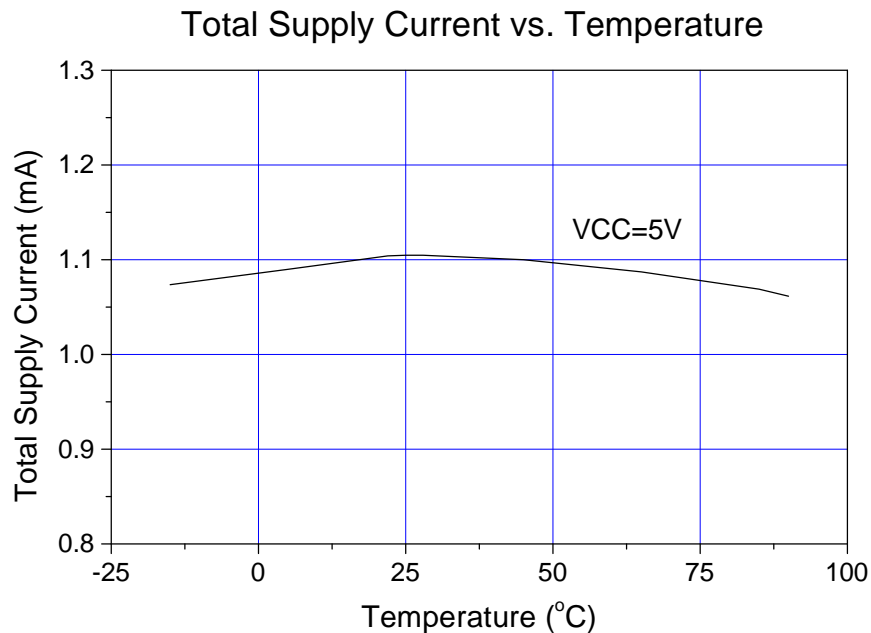


Fig.2 : Total Supply Current vs. Temperature

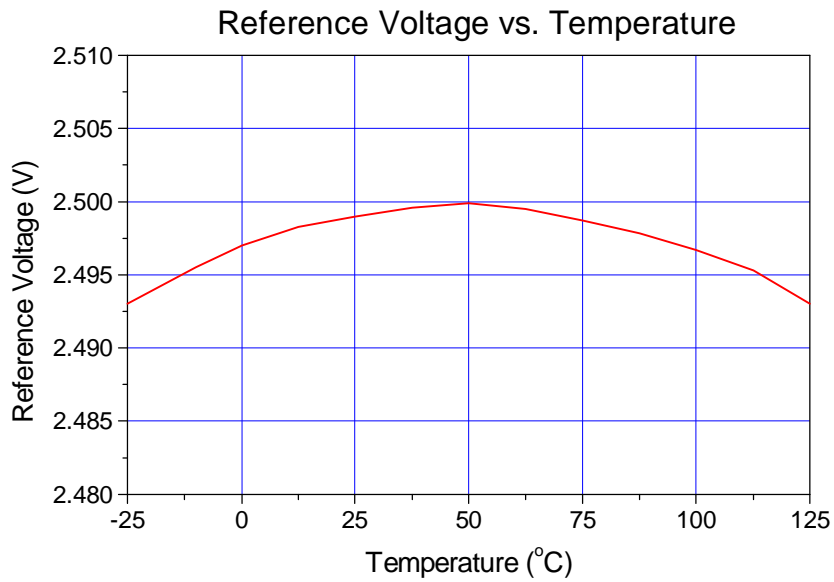


Fig.3 : Reference Voltage vs. Temperature

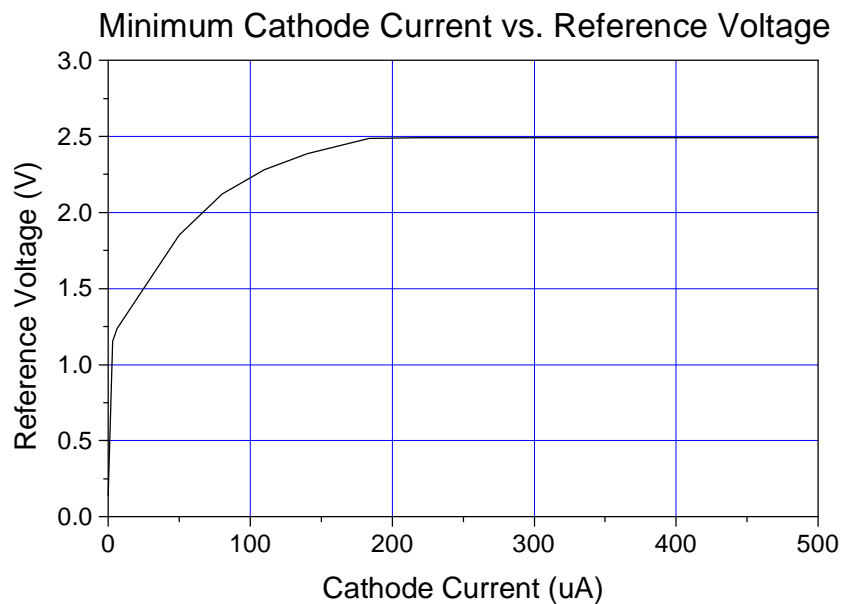


Fig.4 : Minimum Cathode Current VS. Reference Voltage

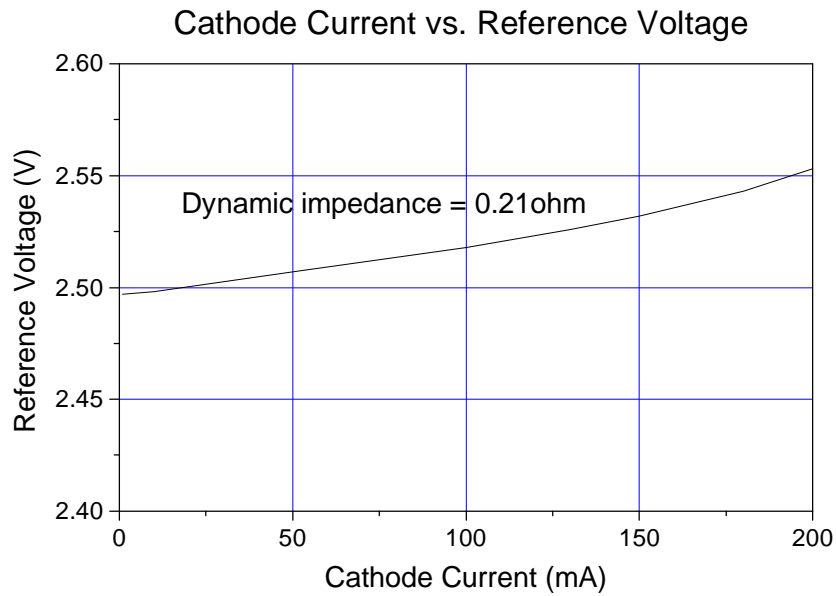


Fig.5 : Cathode Current vs. Reference Voltage

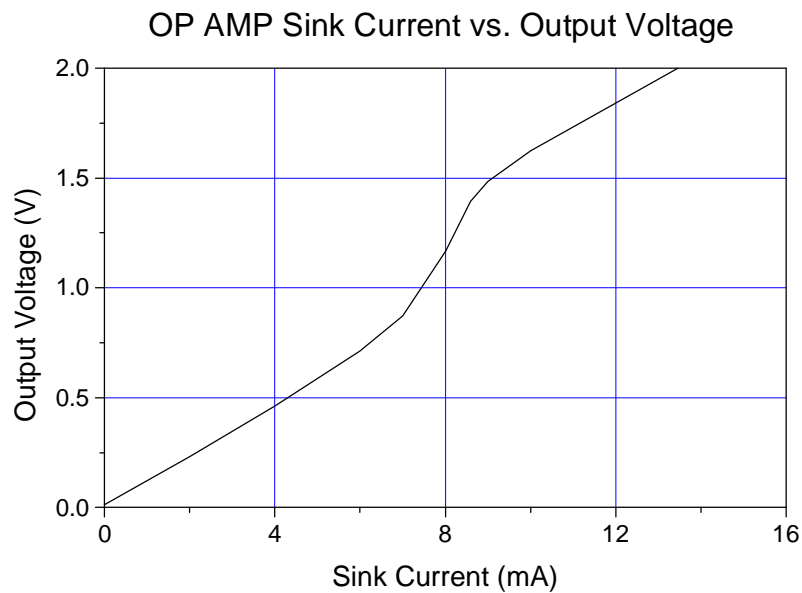


Fig.6 : OP AMP Sink Current vs. Output Voltage

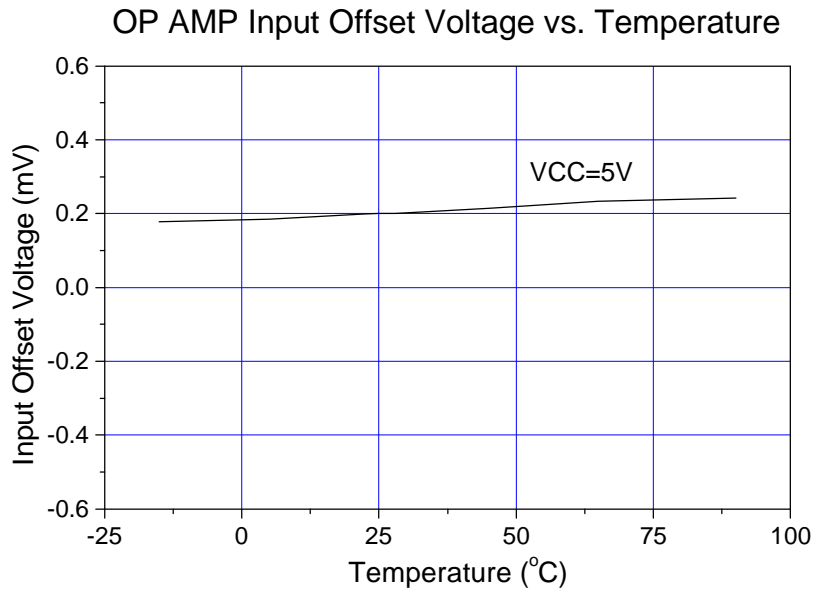


Fig.7 : OP AMP Input Offset Voltage vs. Temperature

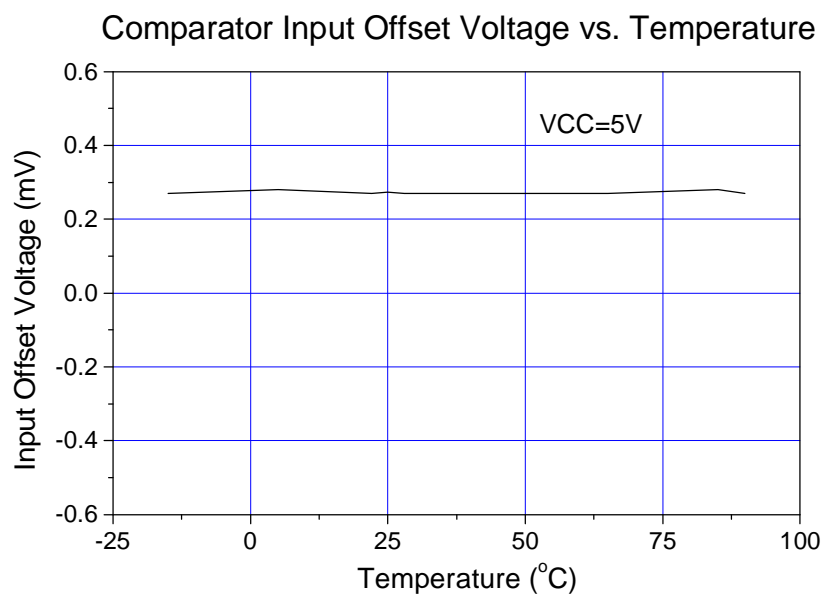


Fig.8 : Comparator Input Offset Voltage vs. Temperature

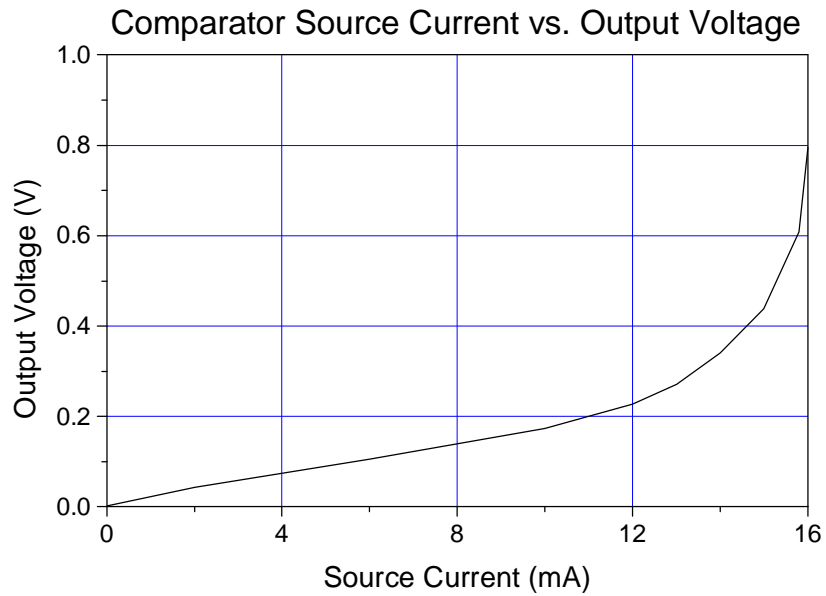
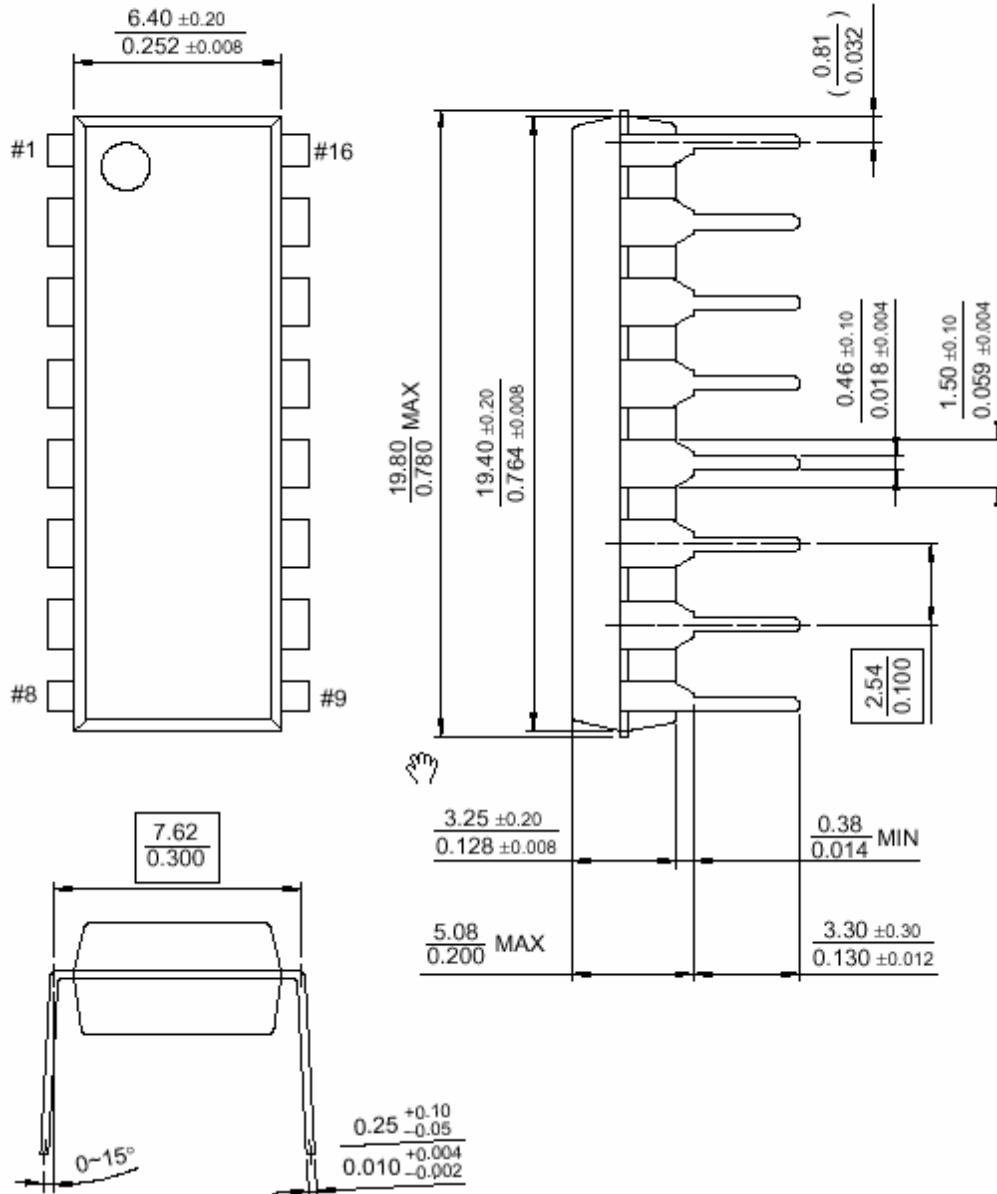


Fig.9 : Comparator Source Current vs. Output Voltage

PACKAGE DIMENSION

16-DIP



PACKAGE DIMENSION

16-SOP

