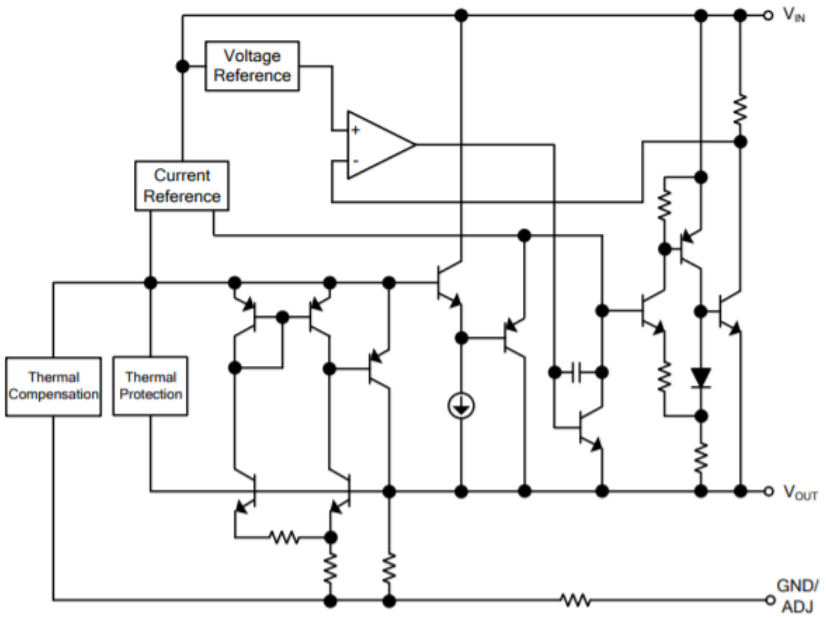
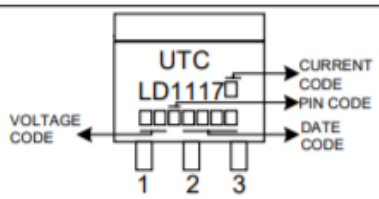
LM1117-TO-220(穩 3.3V)

內部電路



型號

TO-220	A	GND	OUT	IN
	B	OUT	GND	IN
	C	GND	IN	OUT
	D	IN	GND	OUT

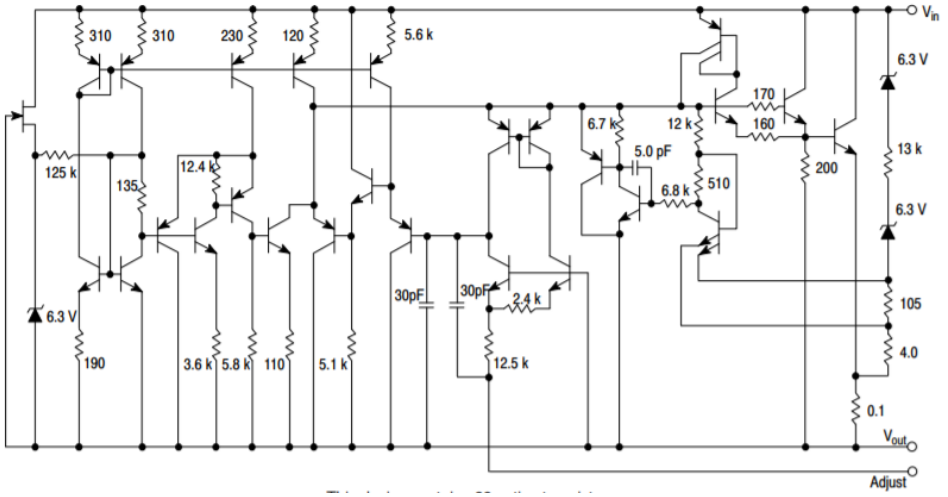


電性

For LD1117/A-3.3

PARAMETER	SYMBOL	TEST CONDITIONS		MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	V_{IN}=5.3V, I_{OUT}=10mA, T_J=25°C		3.234	3.300	3.366	V
Output Voltage	V_{OUT}	V_{IN}=4.75 to 10V LD1117 : I_{OUT}=0~800mA LD1117A : I_{OUT}=0~1000mA		3.234	3.300	3.366	V
Line Regulation	ΔV_{OUT}	V_{IN}=4.75 to 15V, I_{OUT}=0mA			1	6	mV
Load Regulation	ΔV_{OUT}	V_{IN}=4.75V LD1117 : I_{OUT}=0~800mA LD1117A : I_{OUT}=0~1000mA			1	10	mV
Temperature stability	ΔV_{OUT}				0.5		%
Long Term Stability	ΔV_{OUT}	1000 hrs, T_J=125°C			0.3		%
Operating Input Voltage	V_{IN}	I_{OUT}=100mA				15	V
Quiescent Current	I_Q	V_{IN}≤15V			5	10	mA
Current Limit	I_{LIMIT}	V_{IN}=8.3V, T_J=25°C	LD1117	800			mA
			LD1117A	1000			
Output Noise Voltage	e_N	B=10Hz to 10KHz, T_J=25°C			100		μV
Supply Voltage Rejection	SVR	I_{OUT}=40mA, f=120Hz, T_J=25°C, V_{IN}=6.3V, V_{RIPPLE}=1V_{PP}		60	75		dB
Dropout Voltage	V_D	I_{OUT}=100mA			1.00	1.10	V
		I_{OUT}=500mA			1.15	1.25	
		I_{OUT}=800mA			1.20	1.30	
		I_{OUT}=1A			1.20	1.30	
Thermal Regulation		T_A=25°C, 30ms Pulse			0.01	0.10	%/W

LM317(可調穩壓，輸出可超過 1.5A)



V_I - V_O = 5 V, I_O = 500 mA, I_{MAX} = 1.5 A and P_{MAX} = 20 W, T_J = 0 to 125 °C, unless otherwise specified.

Table 4. Electrical characteristics for LM317

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
ΔV_O	Line regulation	V_I - V_O = 3 to 40 V	T_J = 25°C		0.01	0.04	%/V
					0.02	0.07	
ΔV_O	Load regulation	$V_O \leq 5$ V	T_J= 25°C		5	25	mV
		I_O = 10 mA to I_{MAX}			20	70	
		$V_O \geq 5$ V,	T_J = 25°C		0.1	0.5	%
		I_O = 10 mA to I_{MAX}			0.3	1.5	
I_{ADJ}	Adjustment pin current				50	100	µA
ΔI_{ADJ}	Adjustment pin current	V_I - V_O = 2.5 to 40 V I_O = 10 mA to I_{MAX}			0.2	5	µA
V_{REF}	Reference voltage (between pin 3 and pin 1)	V_I - V_O = 2.5 to 40 V I_O = 10 mA to I_{MAX} $P_D \leq P_{MAX}$		1.2	1.25	1.3	V
$\Delta V_O/V_O$	Output voltage temperature stability				1		%
$I_{O(min)}$	Minimum load current	V_I - V_O = 40 V			3.5	10	mA
$I_{O(max)}$	Maximum load current	V_I - $V_O \leq$ 15 V, $P_D < P_{MAX}$		1.5	2.2		A
		V_I - V_O = 40 V, $P_D < P_{MAX}$, T_J = 25°C		0.4			
eN	Output noise voltage (percentage of V_O)	B = 10 Hz to 100 kHz, T_J = 25°C			0.003		%
SVR	Supply voltage rejection (1)	T_J = 25°C, f = 120 Hz	C_{ADJ} = 0		65		dB
			C_{ADJ} = 10 µF	66	80		

1. *C_{ADJ} is connected between adjust pin and ground.*

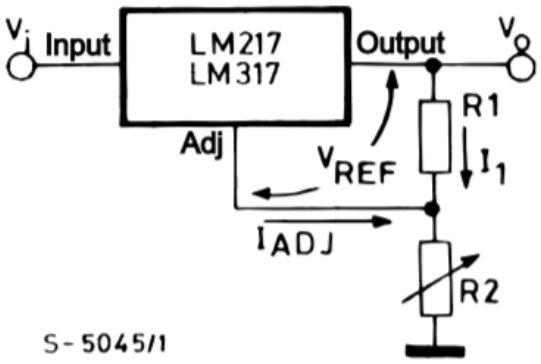
Features

- Output voltage range: 1.2 to 37 V
- Output current in excess of 1.5 A
- 0.1% line and load regulation
- Floating operation for high voltages
- Complete series of protections: current limiting, thermal shutdown and SOA control

Vref=1.25V=Vo-adj

Iadj=50 μA

Vo=Vref(1+R2/R1)+Iadj*R2



C1 input bypass capacitor(旁通電容)

C2 increase ripple rejection(電壓抑制比)15dB

PSRR=20log(ΔV_{supply} /ΔV_{out})dB

Power supply ripple rejection 電源電壓抑制比

C3 tantulum 電容(or 25μF 鋁電容) improve transient response

D1 protect LM317 against input short circuit

D2 protect output short circuit for capacitance discharging

Figure 7. Voltage regulator with protection diodes

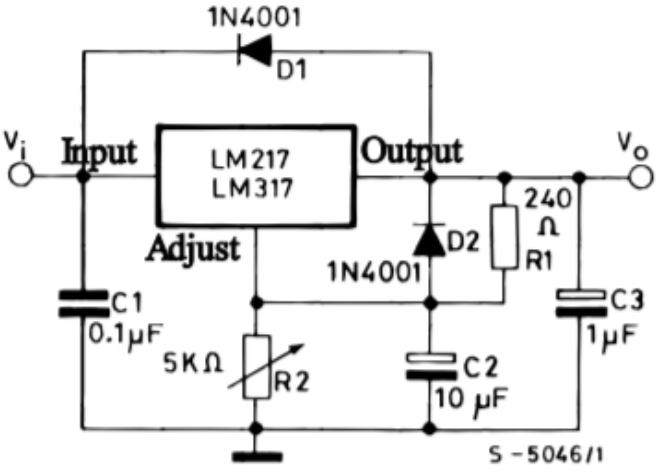
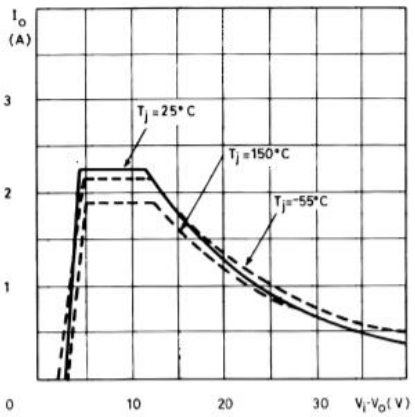


Figure 3. Output current vs. input-output differential voltage



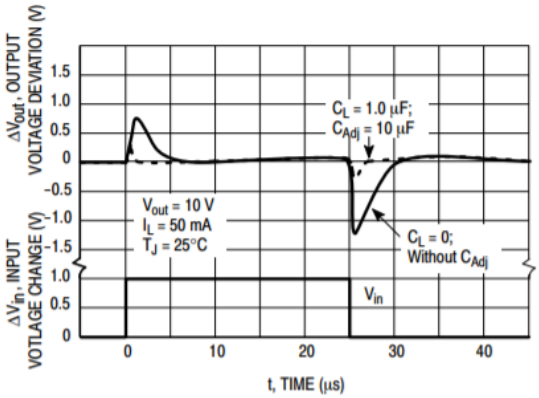


Figure 17. Line Transient Response

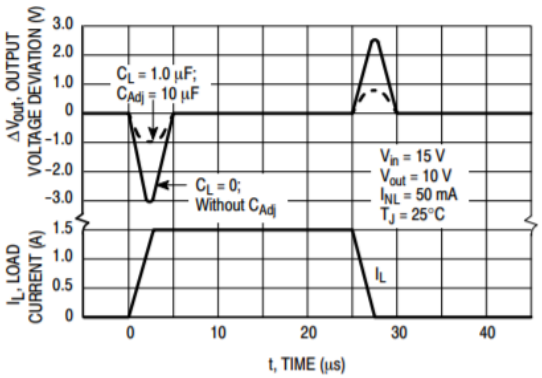
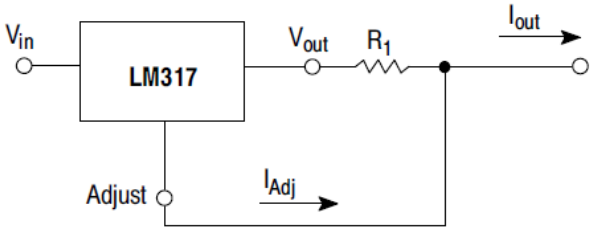


Figure 18. Load Transient Response



$$I_{out} = \left(\frac{V_{ref}}{R_1}\right) + I_{Adj}$$

$$= \frac{1.25\ V}{R_1}$$

$$10\ mA \le I_{out} \le 1.5\ A$$

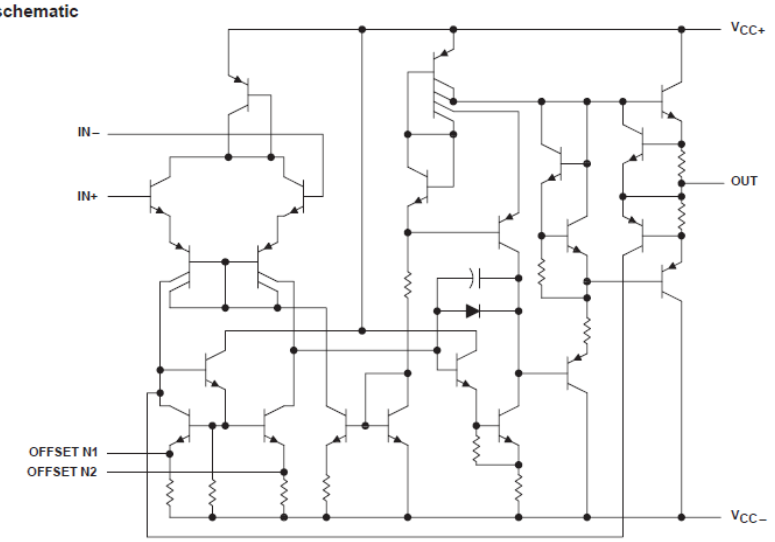
Figure 26. Current Regulator

Line regulation(電源電壓調整率，線性調整率)

Load regulation(負載調整率)

UA741C(P)

schematic



		µA741C
Supply voltage, V_{CC+} (see Note 1)		18
Supply voltage, V_{CC-} (see Note 1)		−18
Differential input voltage, V_{ID} (see Note 2)		±15
Input voltage, V_I any input (see Notes 1 and 3)		±15
Voltage between offset null (either OFFSET N1 or OFFSET N2) and V_{CC-}		±15
Duration of output short circuit (see Note 4)		unlimited
Continuous total power dissipation		Se
Operating free-air temperature range, T_A		0 to 70
Storage temperature range		−65 to 150
Case temperature for 60 seconds	FK package	
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds	J, JG, or U package	
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	D, P, or PW package	260

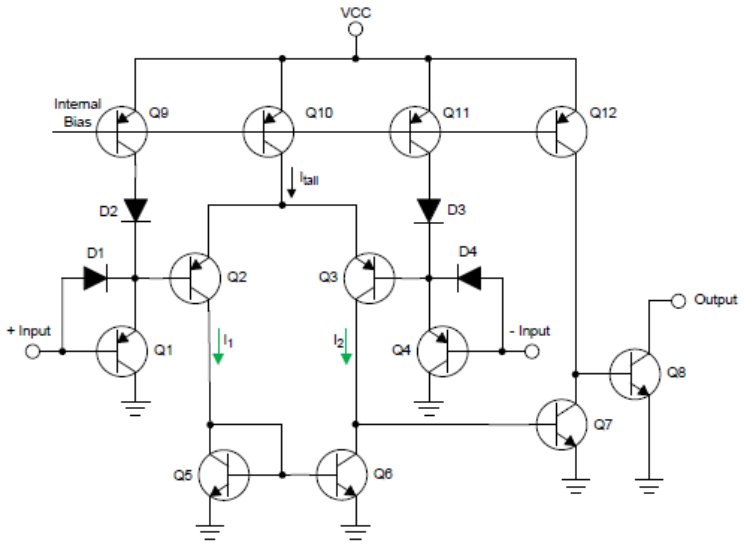
Vcc=±15V condition

6.7 Electrical Characteristics, LM741C[1]

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
Input offset voltage		$R_S \le 10$ kΩ	T_A = 25°C		2	6	mV
			$T_{AMIN} \le T_A \le T_{AMAX}$			7.5	mV
Input offset voltage adjustment range		T_A = 25°C, V_S = ±20 V			±15		mV
Input offset current		T_A = 25°C			20	200	nA
		$T_{AMIN} \le T_A \le T_{AMAX}$				300	
Input bias current		T_A = 25°C			80	500	nA
		$T_{AMIN} \le T_A \le T_{AMAX}$				0.8	µA
Input resistance		T_A = 25°C, V_S = ±20 V		0.3	2		MΩ
Input voltage range		T_A = 25°C		±12	±13		V
Large signal voltage gain		V_S = ±15 V, V_O = ±10 V, $R_L \ge 2$ kΩ	T_A = 25°C	20	200		V/mV
			$T_{AMIN} \le T_A \le T_{AMAX}$	15			
Output voltage swing		V_S = ±15 V	$R_L \ge 10$ kΩ	±12	±14		V
			$R_L \ge 2$ kΩ	±10	±13		
Output short circuit current		T_A = 25°C			25		mA
Common-mode rejection ratio		$R_S \le 10$ kΩ, V_{CM} = ±12 V, $T_{AMIN} \le T_A \le T_{AMAX}$		70	90		dB
Supply voltage rejection ratio		V_S = ±20 V to V_S = ±5 V, $R_S \le 10$ Ω, $T_{AMIN} \le T_A \le T_{AMAX}$		77	96		dB
Transient response	Rise time	T_A = 25°C, Unity Gain			0.3		µs
	Overshoot				5%		
Slew rate		T_A = 25°C, Unity Gain			0.5		V/µs
Supply current		T_A = 25°C			1.7	2.8	mA
Power consumption		V_S = ±15 V, T_A = 25°C			50	85	mW

LM393(P)

達靈頓



PARAMETER		TEST CONDITIONS		T_A [1]	LM293 LM393			UNIT
					MIN	TYP	MAX	
V_{IO}	Input offset voltage	V_{CC} = 5 V to 30 V, V_{IC} = V_{ICR} min, V_O = 1.4 V		25°C		2	5	mV
				Full range			9	
I_{IO}	Input offset current	V_O = 1.4 V		25°C		5	50	nA
				Full range			250	
I_{IB}	Input bias current	V_O = 1.4 V		25°C		–25	–250	nA
				Full range			–400	
V_{ICR}	Common-mode input-voltage range [2]			25°C	0 to V_{CC} – 1.5			V
				Full range	0 to V_{CC} – 2			
A_{VD}	Large-signal differential-voltage amplification	V_{CC} = 15 V, V_O = 1.4 V to 11.4 V, R_L ≥ 15 kΩ to V_{CC}		25°C	50	200		V/mV
I_{OH}	High-level output current	V_{OH} = 5 V	V_{ID} = 1 V	25°C		0.1	50	nA
		V_{OH} = 30 V	V_{ID} = 1 V	Full range			1	µA
V_{OL}	Low-level output voltage	I_{OL} = 4 mA,	V_{ID} = –1 V	25°C		130	400	mV
				Full range			700	
I_{OL}	Low-level output current	V_{OL} = 1.5 V,	V_{ID} = –1 V	25°C	6			mA
I_{CC}	Supply current	R_L = ∞	V_{CC} = 5 V	25°C		0.45	1	mA
			V_{CC} = 30 V	Full range		0.55	2.5	

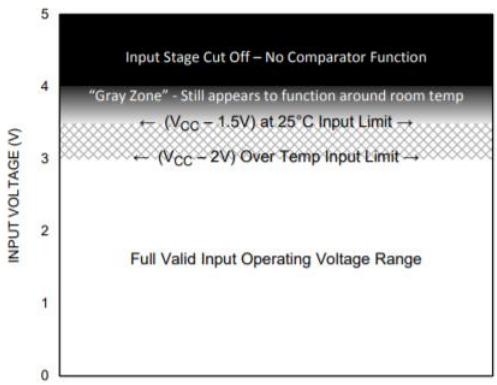


Figure 3. Visual Representation of Input Voltage Range With a 5V Supply

6.14 Typical Characteristics, LMx93, LM2903 (all 'V' and 'A' suffixes)

T_A= 25°C, V_S= 5V, R_{PULLUP}=5.1k, C_L = 15 pF, V_{CM}=0V unless otherwise noted.

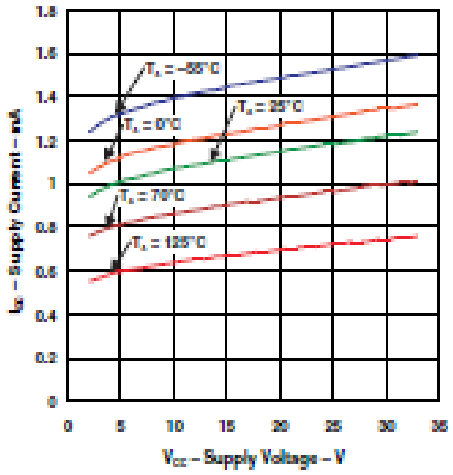


Figure 1. Supply Current vs Supply Voltage

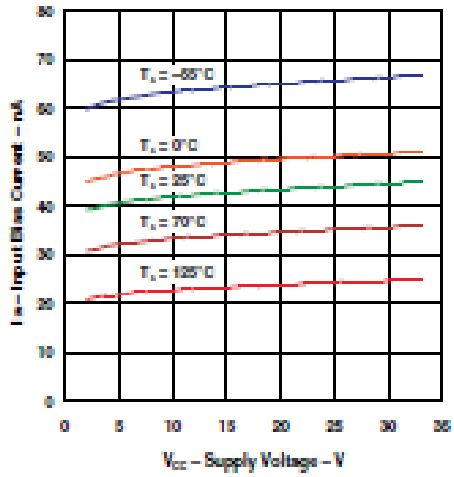


Figure 2. Input Bias Current vs Supply Voltage

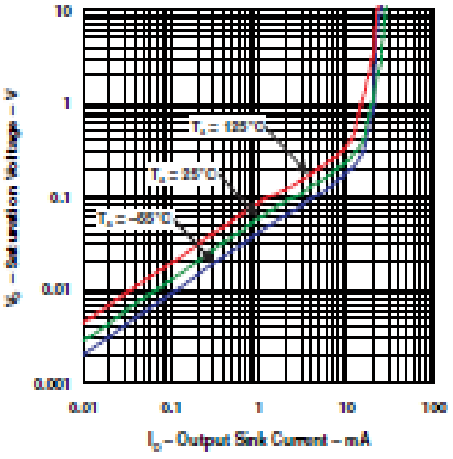


Figure 3. Output Saturation Voltage

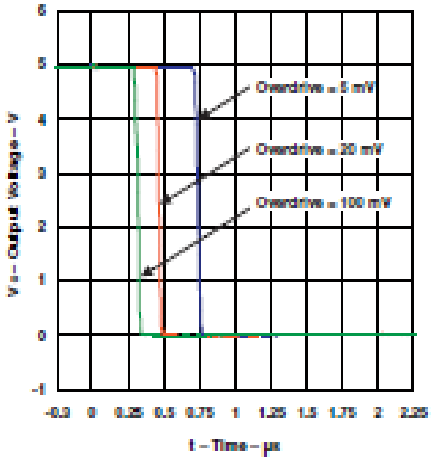


Figure 4. Response Time for Various Overdrives Negative Transition

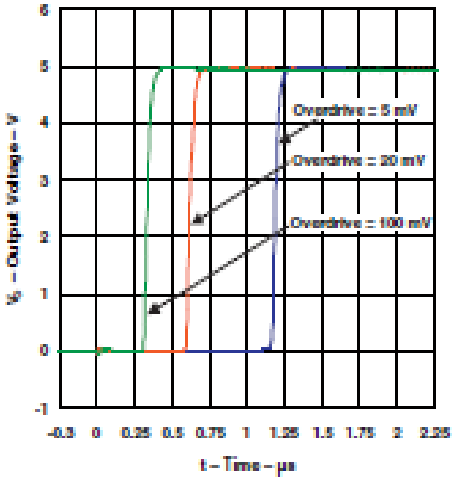


Figure 5. Response Time for Various Overdrives Positive Transition

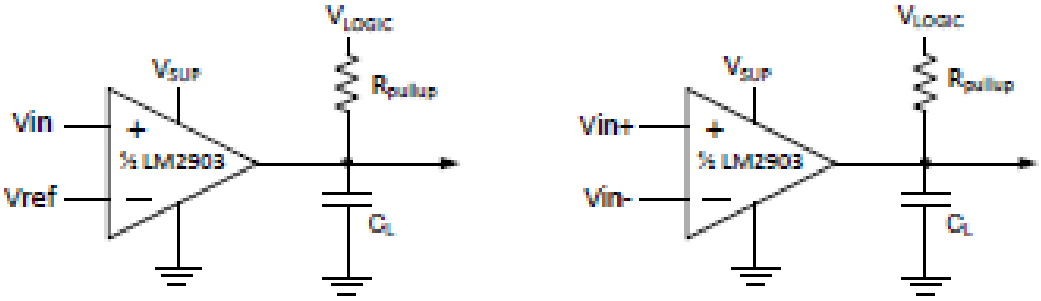


Figure 39. Single-Ended and Differential Comparator Configurations

Table 1. Design Parameters

DESIGN PARAMETER	EXAMPLE VALUE
Input Voltage Range	0 V to Vsup-2 V
Supply Voltage	4.5 V to V_{CC} maximum
Logic Supply Voltage	0 V to V_{CC} maximum
Output Current (R_{PULLUP})	1 µA to 4 mA
Input Overdrive Voltage	100 mV
Reference Voltage	2.5 V
Load Capacitance (C_L)	15 pF

比較器 vs 放大器

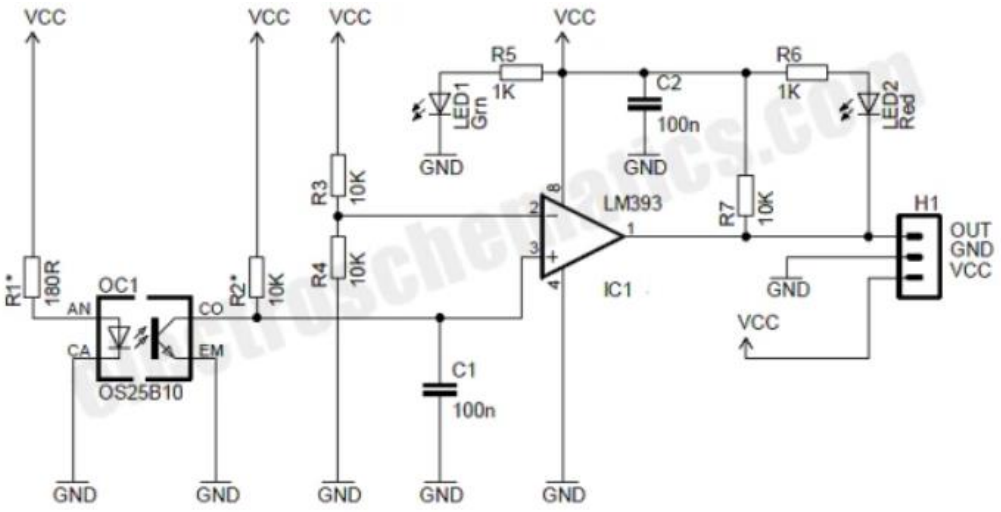
沒有相位補償 vs 相位補償

只有 npn 做 open collector 當輸出 vs pnp 和 npn 當輸出

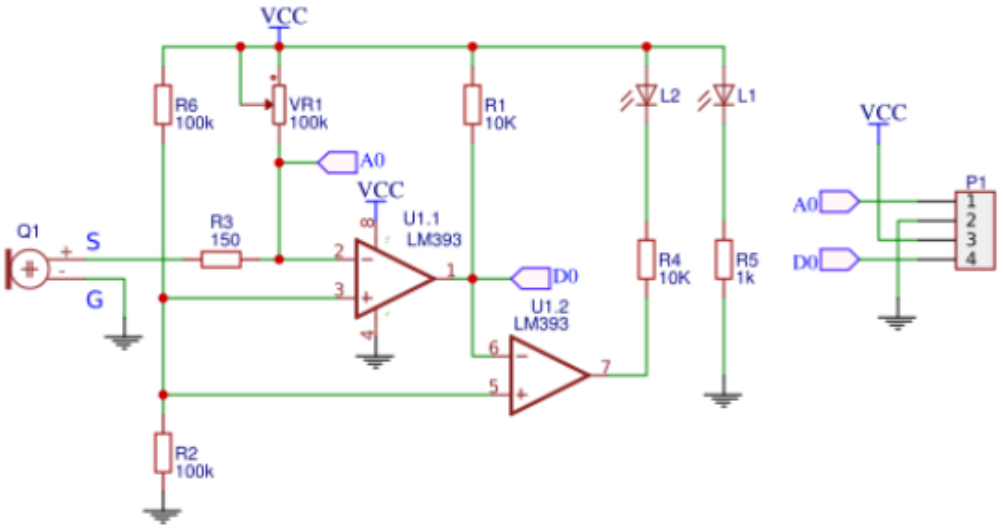
比較器只能做電壓比較，但相對比較電壓速度快

Application

Optical sensor



Microphone sensor



Unusage comparator

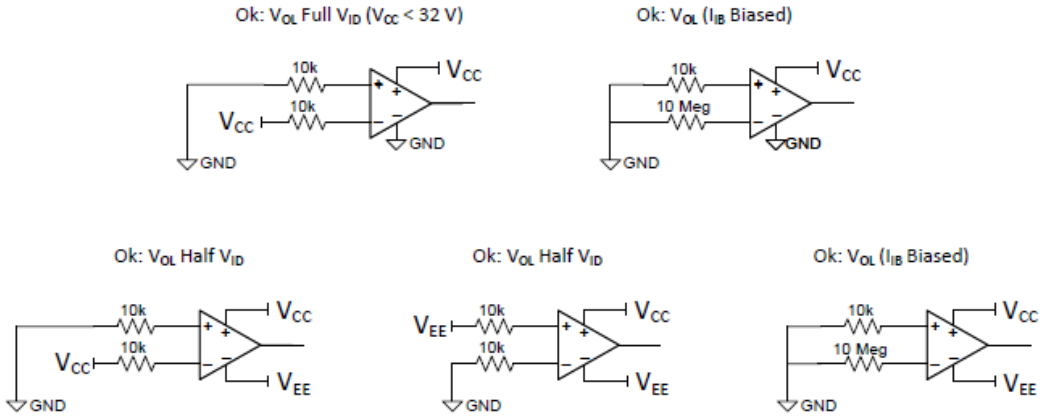


Figure 9. Best Connections Practices for Single and Dual Supplies

Protect negative voltage

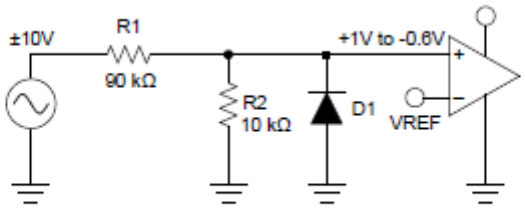
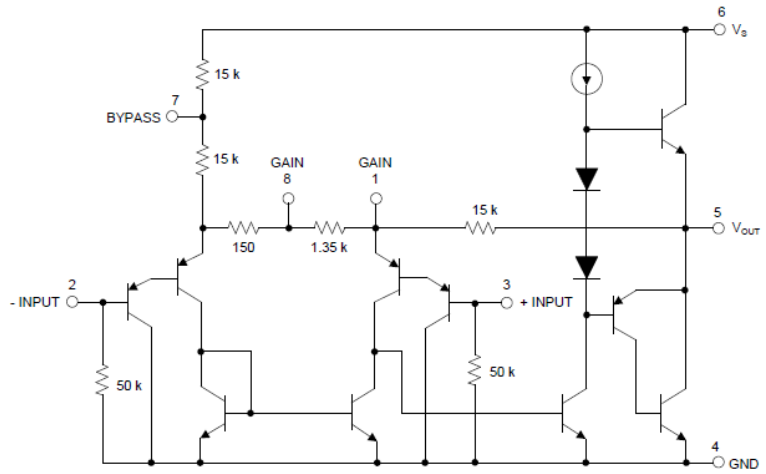


Figure 6. Commonly Used Two-Resistor Voltage Divider with Clamping Diode

comparator 網址

http://www.bristolwatch.com/ele/vc.htm

LM386



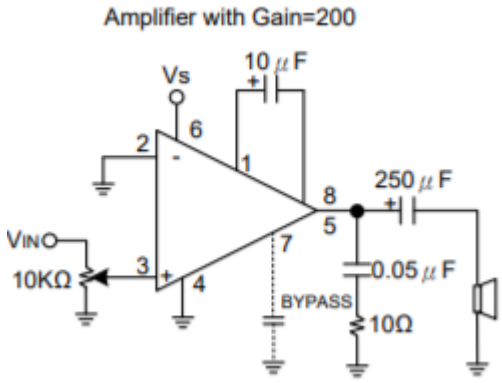
■ **ELECTRICAL CHARACTERISTICS** (T_A=25°C, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Operating Supply Voltage	V_S		4		12	V
Quiescent Current	I_Q	V_S=6V, V_{IN}=0		4	8	mA
Output Power	P_{OUT}	V_S=6V, R_L=8Ω, THD=10%	250	325		mW
		V_S=9V, R_L=8Ω, THD=10%	500	700		
Voltage Gain	G_V	V_S=6V, f=1kHz 10μF from pin 1 to pin 8		26 46		dB dB
Bandwidth	BW	V_S=6V , Pin1 and pin 8 open		300		kHz
Total Harmonic Distortion	THD	P_{OUT}=125mW, V_S=6V, f=1kHz R_L=8Ω pin1 and pin 8 open		0.2		%
Rejection Ratio	RR	V_S=6V, f=1kHz, C_{BYPASS}=10μF pin1and pin 8 open, Referred to output		50		dB
Input Resistance	R_{IN}			50		kΩ
Input Bias Current	I_{BIAS}	V_S=6V Pin2 and pin 3 open		250		nA

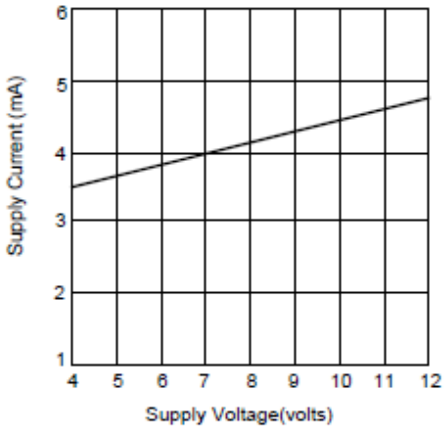
■ **ABSOLUTE MAXIMUM RATINGS**

PARAMETER		SYMBOL	RATINGS	UNIT
Supply Voltage		V_{CC}	15	V
Input Voltage		V_{IN}	-0.4V ~ +0.4V	V
Power Dissipation	DIP-8	P_D	1250	mW
	SOP-8		600	mW
	TSSOP-8		600	mW
Junction Temperature		T_J	+125	°C
Operating Temperature		T_{OPR}	-40 ~ +85	°C
Storage Temperature		T_{STG}	-40 ~ +150	°C

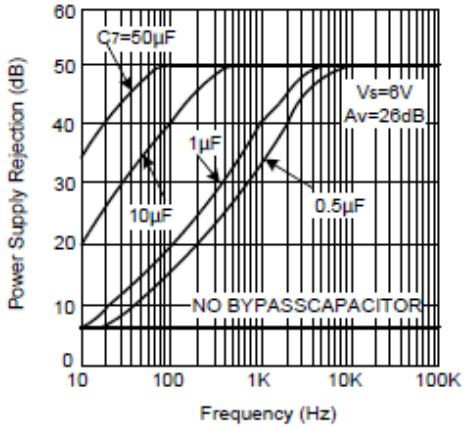
只接 10μF



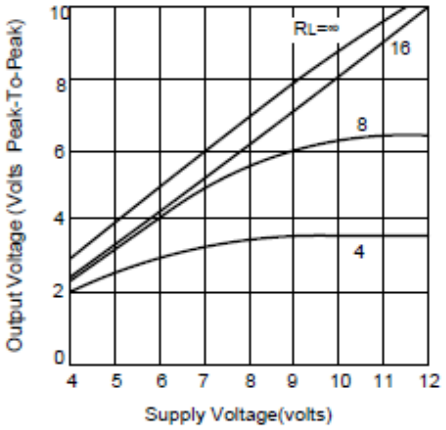
Quiescent Supply Current vs Supply Voltage



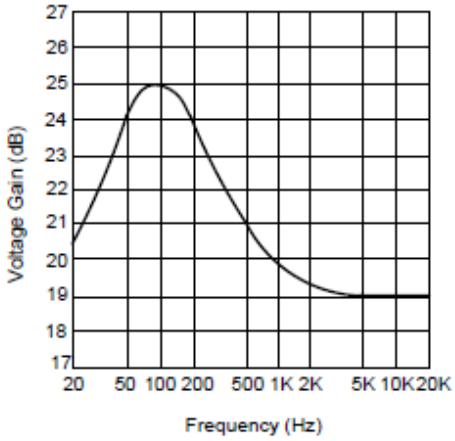
Power Supply Rejection Ratio(Referred to the Output) vs Frequency



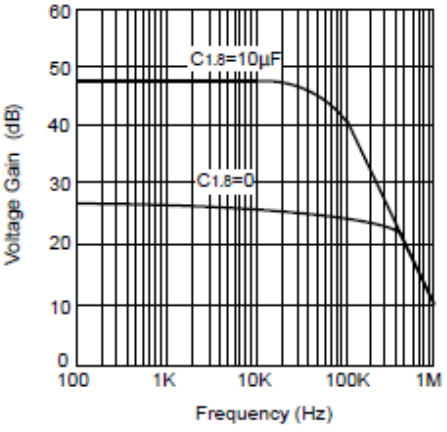
Peak-to -Peak Output Voltage Swing vs Supply Voltage



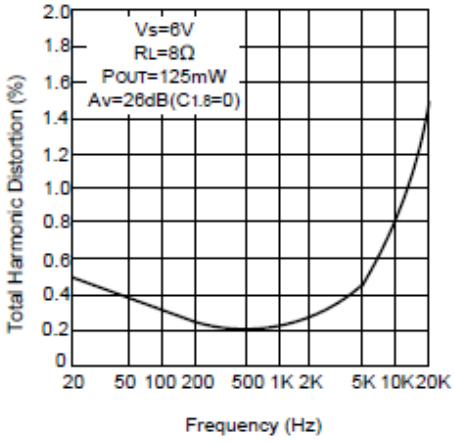
Frequency Response With Bass Boost



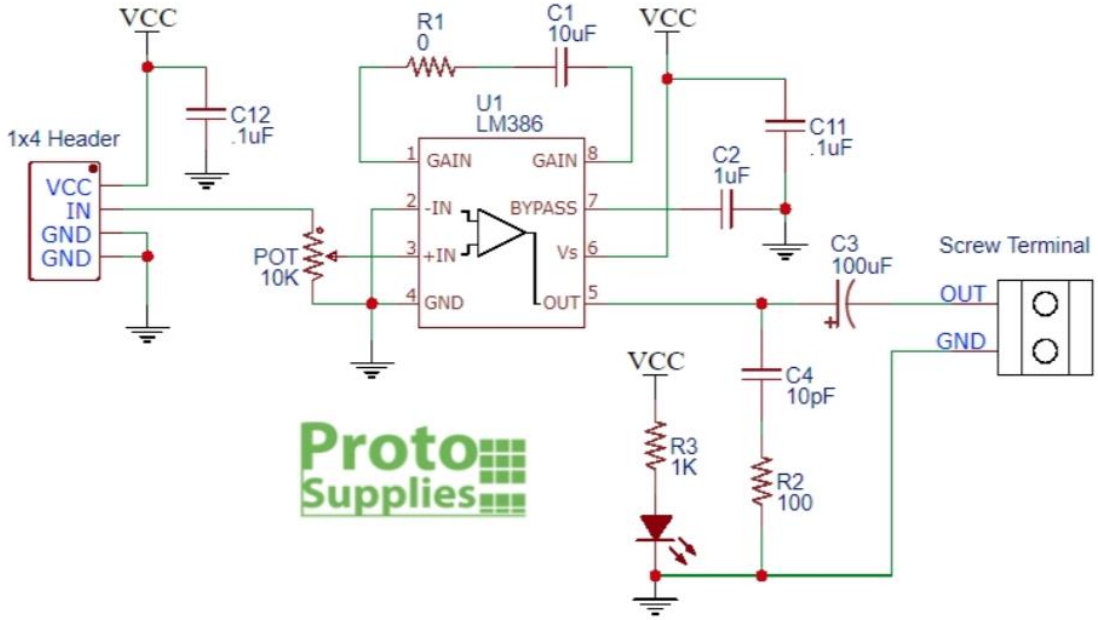
Voltage Gain vs Frequency



Distortion vs Frequency



Lm386 module


VCC
R1
0
C1
10uF
VCC
U1
LM386
C12
.1uF
1x4 Header
VCC
IN
GND
GND
1
GAIN
GAIN
8
2
-IN
BYPASS
7
3
+IN
Vs
6
4
GND
OUT
5
C2
1uF
C11
.1uF
POT
10K
C3
100uF
Screw Terminal
OUT
GND
VCC
C4
10pF
R3
1K
R2
100
Proto
Supplies