

■ DESCRIPTION

The **M54123** is a semiconductor integrated circuit with amplifier for a high-speed earth leakage circuit breaker.

■ FEATURES

Good temperature characteristics of input sensitivity current  
High input sensitivity ( $V_T=6.1\text{mV Typ.}$ )  
Low external component count  
High noise and surge-proof  
Low power dissipation ( $P_d=5\text{mW Typ.}$ ) and may be used both-as 100V and 200V.  
High mounting density by SIL package with 8 pins  
Wide temperature range ( $T_A=-20^\circ\text{C}\sim+80^\circ\text{C}$ )

■ APPLICATION: High speed earth leakage circuit breaker

■ FUNCTION

The **M54123** circuit for the amplifying parts of earth leakage circuit breaker consists of differential amplifier, latch circuit and voltage regulator. It is connected to the secondary side of the zerocurrent transformer (ZCT) which detects leakage current in the both input of the differential amplifier. Signals amplified by differential amplifier are integrated by an external capacitor, and connects to the input terminal of latch circuit with output suitable for the characteristics of high-speed earth leakage circuit breaker. Latch circuit keeps low in the output till the input voltage reaches the fixed level, and output becomes high when the leakage current more than fixed flows. It drives a thyristor connected to the output terminal of latch circuit.

■ 描述

M54123系列是漏電保護器專用集成電路用於高速對地漏電保護器的半導體集成電路。

■ 產品特徵

溫度特性好  
動態輸入靈敏度高(典型值 $V_T=6.1\text{mV}$ )  
使用的線路外圍元件少  
高強度抗干擾與抗衝擊能力  
功耗低(典型值 $5\text{mW}$ )時110~220V範圍均可使用  
高密度多種封規格:  
單列直插8引腳封裝: SIP-8Pin  
雙列直插8引腳封裝: DIP-8Pin  
片式表面貼封裝: SO-8Pin

■ 應用描述: 高速對地漏電保護器集成電路

■ 功能描述

漏電保護器專用集成電路M54123系列用於漏電保護器的信號放大部份，由差分放大器、門鎖電路、穩壓電路組合而成。零電流互感器(ZCT)檢測漏電，次級輸出作為差分放大器的輸入，差分放大器與一個外接電路之電視器接合以將信號放大，並連接到門鎖電路的輸入端。在輸入電壓達到額定值時，門鎖電路的輸出端一直保持低電平；當漏電電流值大於額定值時，輸出端變高，以此來觸發與門鎖電路相連接的可控硅開關元件。

封裝形式  
Package



M54123L  
SIP-8Pin  
單列直插



M54123D  
DIP-8Pin  
雙列直插



M54123S  
SO-8Pin  
SMD

PIN FUNCTIONS 器件引腳描述

引腳 Pin	器件符號 Symbol	功能說明 Function	引腳 Pin	器件符號 Symbol	功能說明 Function
1	$V_R$	參考電壓: Reference Voltage	5	$S_C$	門鎖輸入端: Latch Input
2	$I_N$	輸入端: Input	6	$N_R$	噪聲抑制端: Terminal For Noise Absorption
3	$G_{ND}$	接地端: Ground	7	$O_S$	輸出端: Output
4	$O_D$	差分放大輸出端: Differential Amplifier Outout	8	$V_S$	電源: Supply Voltage

M54123 对应 (与代替) 其他产品型号:

CS54123、HE54123、VG54123、YD54123、XN54123、MV54123、CD54123、LW54123、SN54123

**DESCRIPTION**

The M54123L is a semiconductor integrated circuit with amplifier for a high-speed earth leakage circuit breaker.

**FEATURES**

- Suitable for JIS C 8371
- Good temperature characteristics of input sensitivity current
- High input sensitivity ( $V_T = 6.1\text{mV Typ.}$ )
- Low external component count
- High noise and surge-proof
- Low power dissipation ( $P_d = 5\text{mW Typ.}$ ) and may be used both as 100V and 200V.
- High mounting density by SIL package with 8 pins
- Wide temperature range ( $T_a = -20 - +80^\circ\text{C}$ )

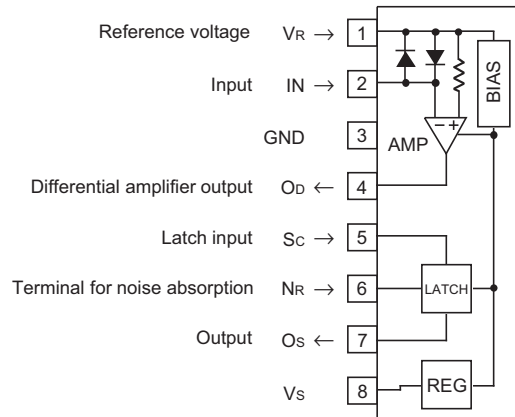
**APPLICATION**

High speed earth leakage circuit breaker

**FUNCTION**

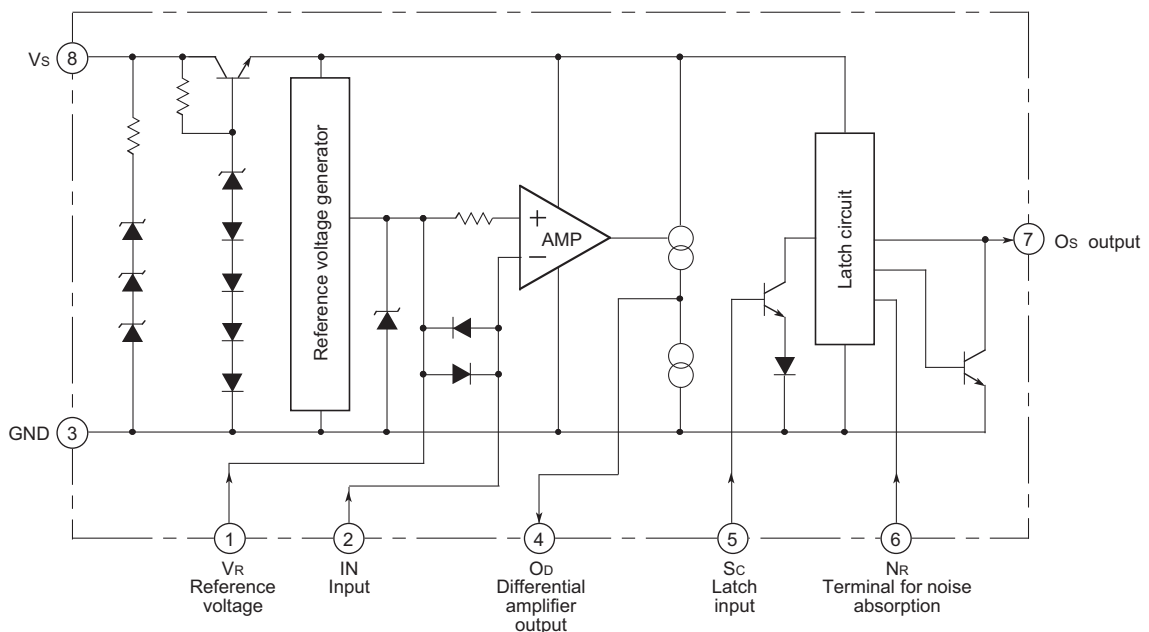
The M54123L circuit for the amplifying parts of earth leakage circuit breaker consists of differential amplifier, latch circuit and voltage regulator. It is connected to the secondary side of the zero-current transformer (ZCT) which detects leakage current in the both input of the differential amplifier. Signals amplified by differential amplifier are integrated by an external capacitor, and connects to the input terminal of latch circuit with output suitable for the characteristics of high-speed earth leakage circuit breaker. Latch circuit keeps low in the output till the input voltage reaches the fixed level, and output becomes high when the leakage current more than fixed flows. It drives a thyristor connected to the output terminal of latch circuit.

**PIN CONFIGURATION (TOP VIEW)**



Package: SIP-8

**BLOCK DIAGRAM 结构框图**



■ Absolute Maximum Ratings (Ta=-20°C~+80°C) 極限參數 (環境溫度Ta=-20°C~+80°C)

符號 Symbol	參數 Parameter	條件 Conditions	額定值 Ratings	單位 Unit
I <sub>S</sub>	電源電流: Supply Current		8	mA
I <sub>VT</sub>	V <sub>R</sub> 腳電流: V <sub>R</sub> Pin Current	Between V <sub>R</sub> -I <sub>N</sub>	250	
		Between V <sub>R</sub> -G <sub>ND</sub>	30	
		Between I <sub>N</sub> -V <sub>R</sub>	-250	
I <sub>IN</sub>	I <sub>N</sub> 腳電流: I <sub>N</sub> Terminal Current	Between I <sub>N</sub> -V <sub>R</sub>	250	
		Between I <sub>N</sub> -G <sub>ND</sub>	30	
		Between V <sub>R</sub> -I <sub>N</sub>	-250	
I <sub>SC</sub>	S <sub>C</sub> 腳電流: S <sub>C</sub> Terminal Current		5	
P <sub>D</sub>	功耗: Power Dissipation		200	mW
T <sub>opr</sub>	環境工作溫度: Operating Temperature		-20~+80	°C
T <sub>stg</sub>	環境儲存溫度: Storage Temperature		-55~+125	

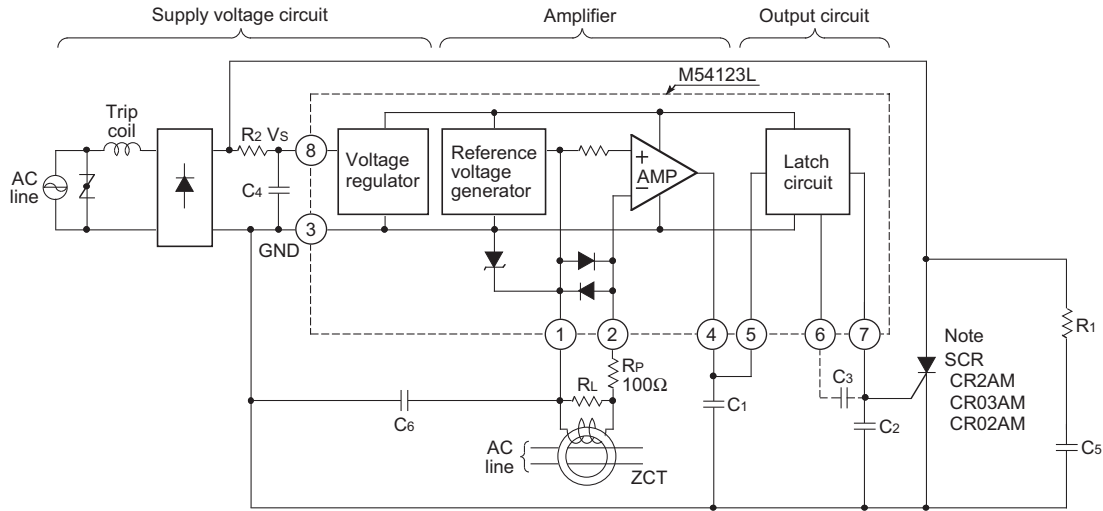
■ ELECTRICAL CHARACTERISTICS (Ta=-20°C~+80°C) 電氣特性 (環境溫度Ta=-20°C~+80°C)

符號 Symbol	參數 Parameter	條件 Conditions	溫度 °C Temperature	最小值 Min.	典型值 Typ.	最大值 Max.	單位 Unit
I <sub>S1</sub>	電源電流 Supply Current	V <sub>S</sub> =12V, V <sub>R</sub> -V <sub>I</sub> =30mV	-20°C	--	--	580	μA
			+25°C	--	400	530	
			+80°C	--	--	480	
V <sub>T</sub>	開啟電壓 Trip Voltage	V <sub>S</sub> =16V, V <sub>R</sub> -V <sub>I</sub>	-20~+80°C	4.0	6.1	9.0	mVms
I <sub>TD1</sub>	定時電流1: Timed current 1	V <sub>S</sub> =16V, V <sub>R</sub> -V <sub>I</sub> =30mV, V <sub>OD</sub> =1.2V	+25°C	-12	--	-30	μA
I <sub>TD2</sub>	定時電流2: Timed current 2	V <sub>S</sub> =16V, short circuit between V <sub>R</sub> & V <sub>I</sub> , V <sub>OP</sub> =0.8V	+25°C	17	--	37	
I <sub>O</sub>	輸出電流 Output Current V <sub>SC</sub> =1.4V, V <sub>OS</sub> =0.8V	I <sub>S1</sub> =580mA	-20°C	-200	--	--	
			+25°C	-100	--	--	
			+80°C	-75	--	--	
V <sub>SC</sub> "ON"	S <sub>C</sub> 開啟電壓: S <sub>C</sub> "ON" Voltage	V <sub>S</sub> =16V	+25°C	0.7	--	1.4	V
I <sub>SC</sub> "ON"	S <sub>C</sub> 輸入電流: S <sub>C</sub> Input Current	V <sub>S</sub> =12V	+25°C	--	--	5.0	μA
I <sub>OSL</sub>	輸出低電平電流: Output Low-level Current	V <sub>S</sub> =12V, V <sub>OSL</sub> =0.2V	-20~+80°C	200	--	--	
V <sub>IC</sub>	輸入鉗位電壓: Input Clamp Voltage	V <sub>S</sub> =12V, I <sub>IC</sub> =20mA	-20~+80°C	4.3	--	6.7	V
V <sub>IDC</sub>	輸入觸發鉗位電壓: Differential Input clamp Voltage	I <sub>IC</sub> =100mA	-20~+80°C	0.4	--	2.0	
V <sub>SM</sub>	Maximum Current Voltage	I <sub>SM</sub> =7mA	+25°C	20	--	28	
I <sub>S2</sub>	Supply Current 2	V <sub>R</sub> -V <sub>I</sub> V <sub>OS</sub> =0.6V	-20~+80°C	--	--	900	μA
V <sub>S</sub> "OFF"	門鎖電路斷態電源電壓: Latch circuit is off-state supply Voltage		+25°C	0.5	--	--	V
T <sub>ON</sub>	動作時間: Operating Time	V <sub>S</sub> =16V, V <sub>R</sub> -V <sub>I</sub> =0.3V	+25°C	2.0	--	4.0	mS

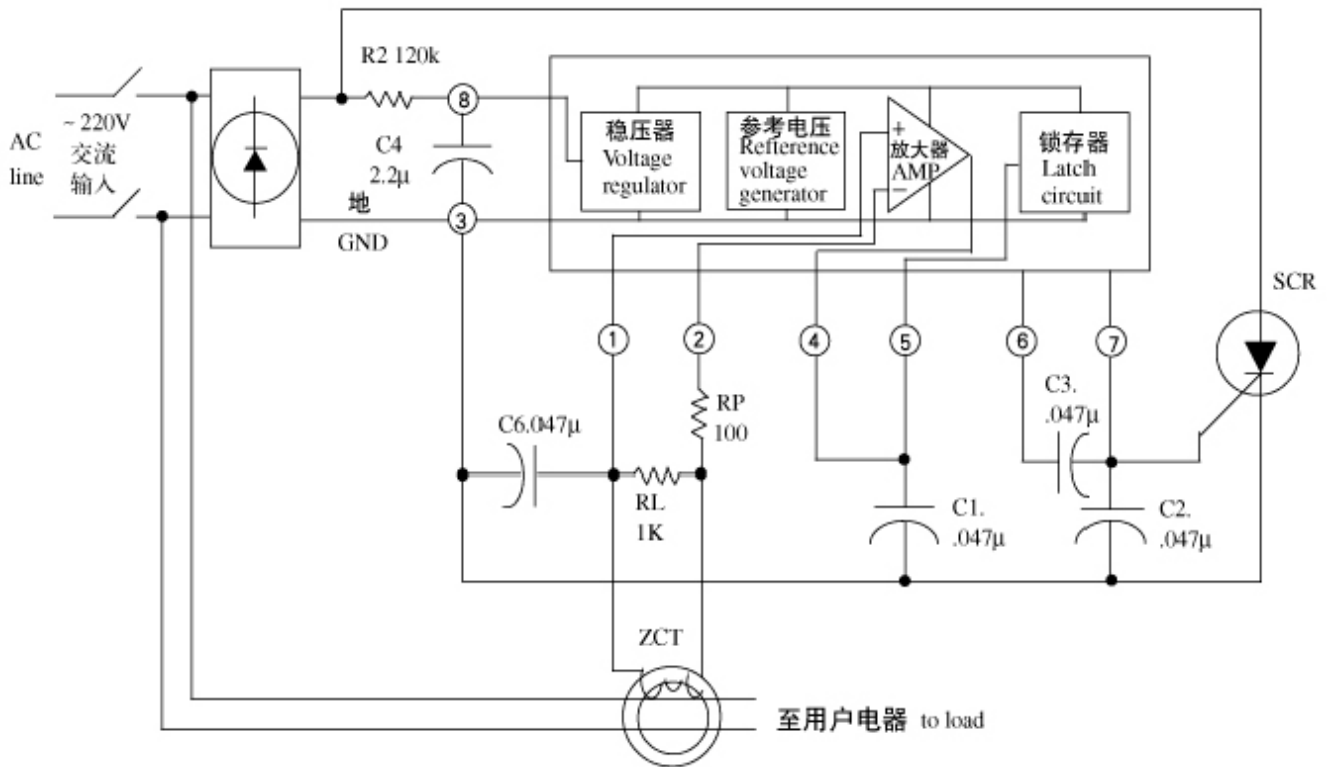
注释: \* 在溫度T=25°C時的典型值

注: 考慮到用戶在生產使用時的一致性, 將V<sub>T</sub>值劃分為3段, 分別為: 7.1~7.6, 7.6~8.1, 8.1~8.8mV, 單位(毫伏)。

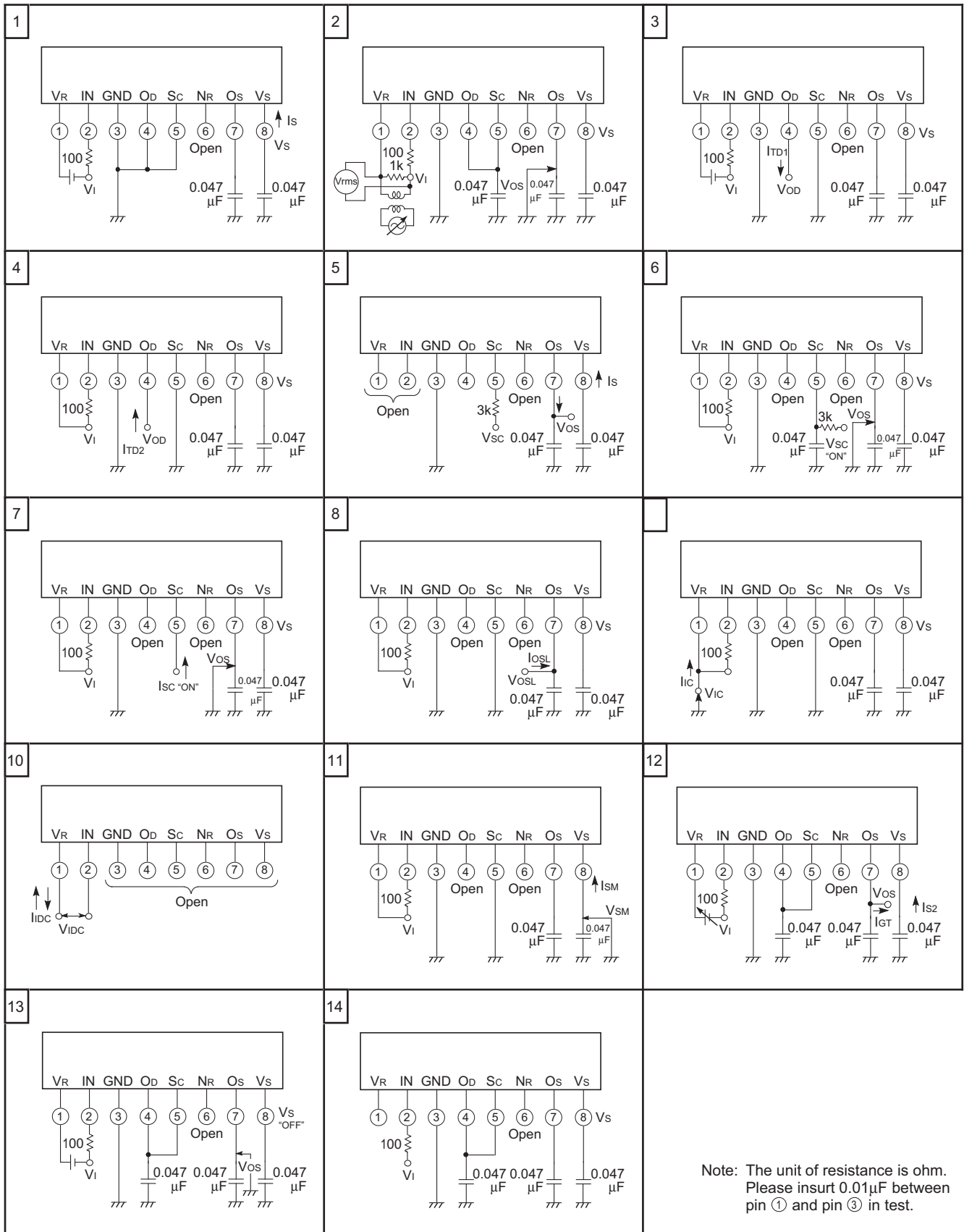
APPLICATION EXAMPLE  
HIGH-SPEED LEAKAGE CIRCUIT BREAKER WITH M54123L  
应用实例: 高速漏电断路器 M54123L



■ APPLICATION EXAMPLE 典型應用電路

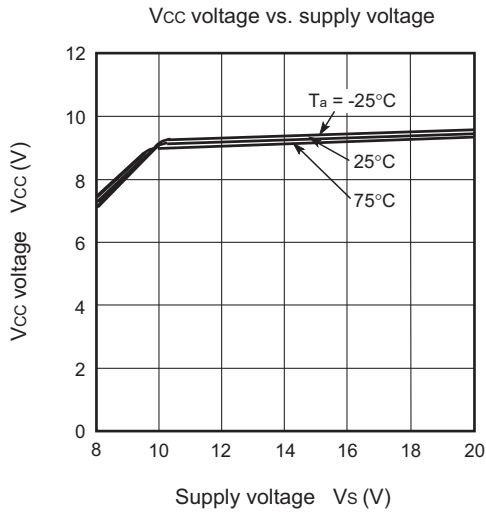


TEST CIRCUIT 测试电路

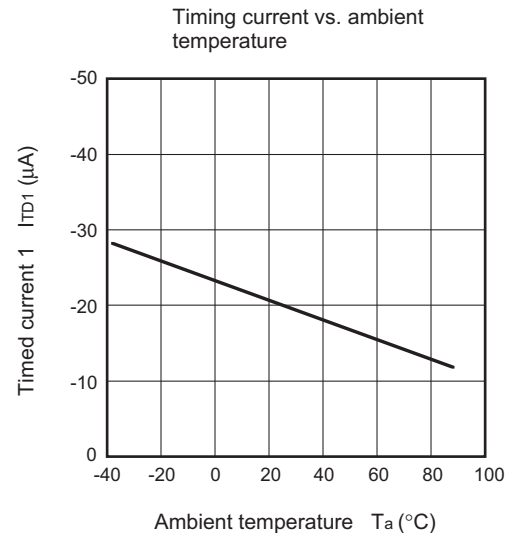
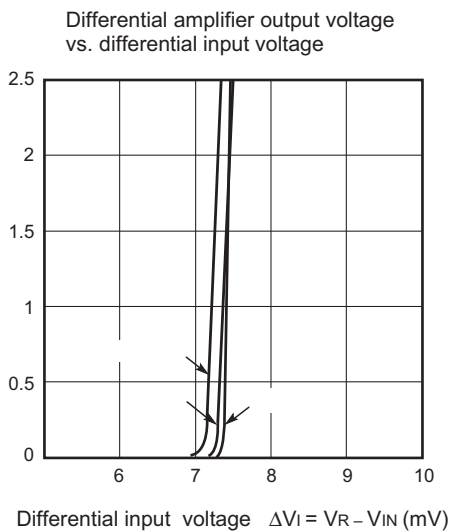
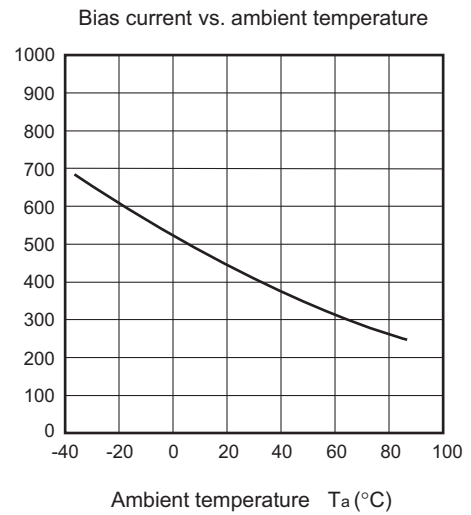
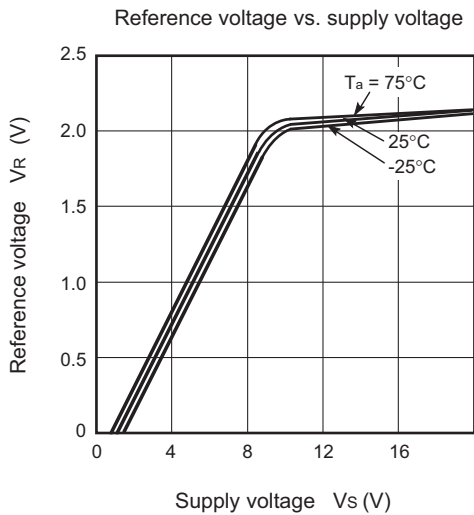
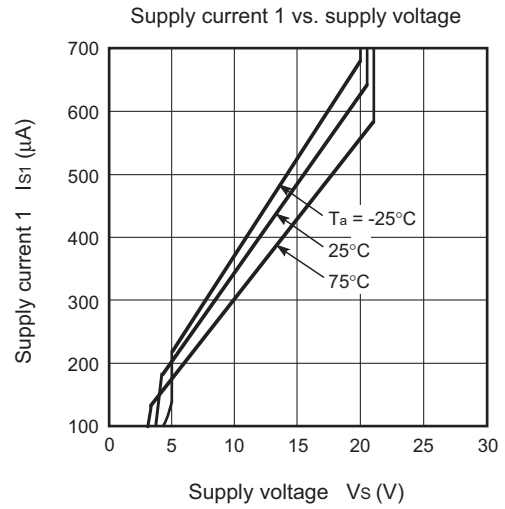


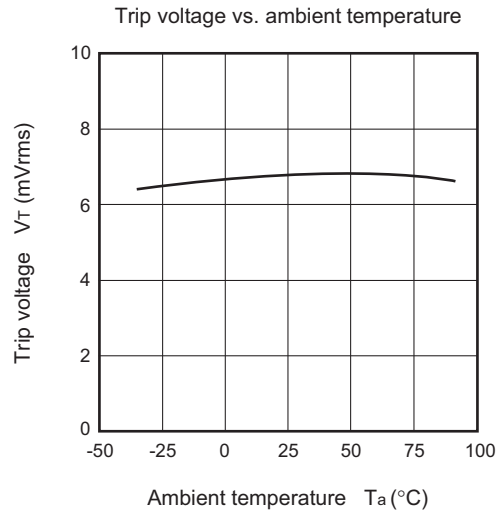
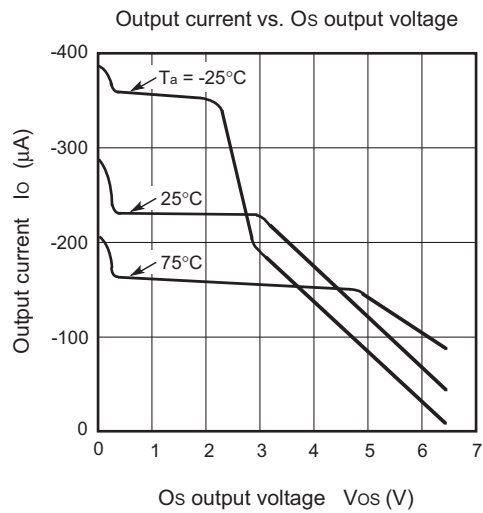
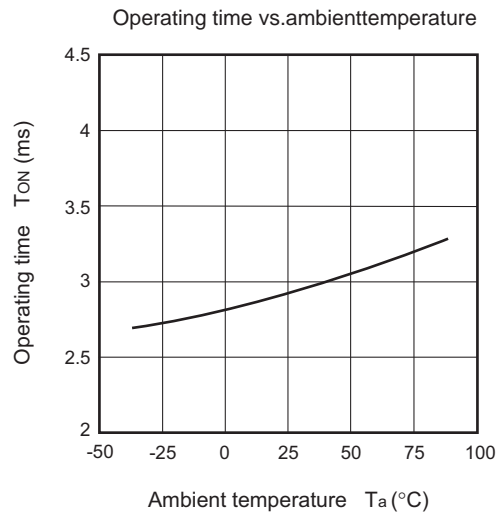
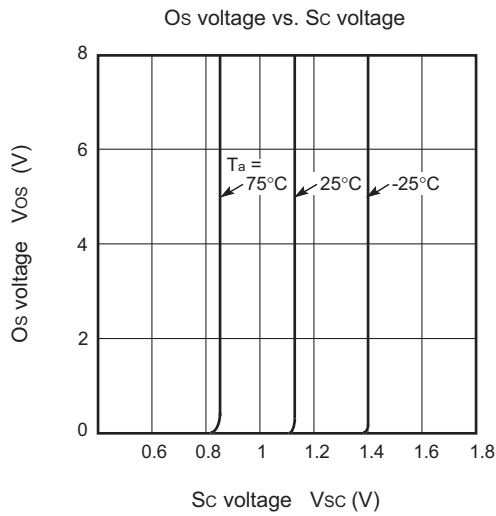
Note: The unit of resistance is ohm.  
Please insert 0.01 μF between pin ① and pin ③ in test.

TYPICAL CHARACTERISTICS 典型特征

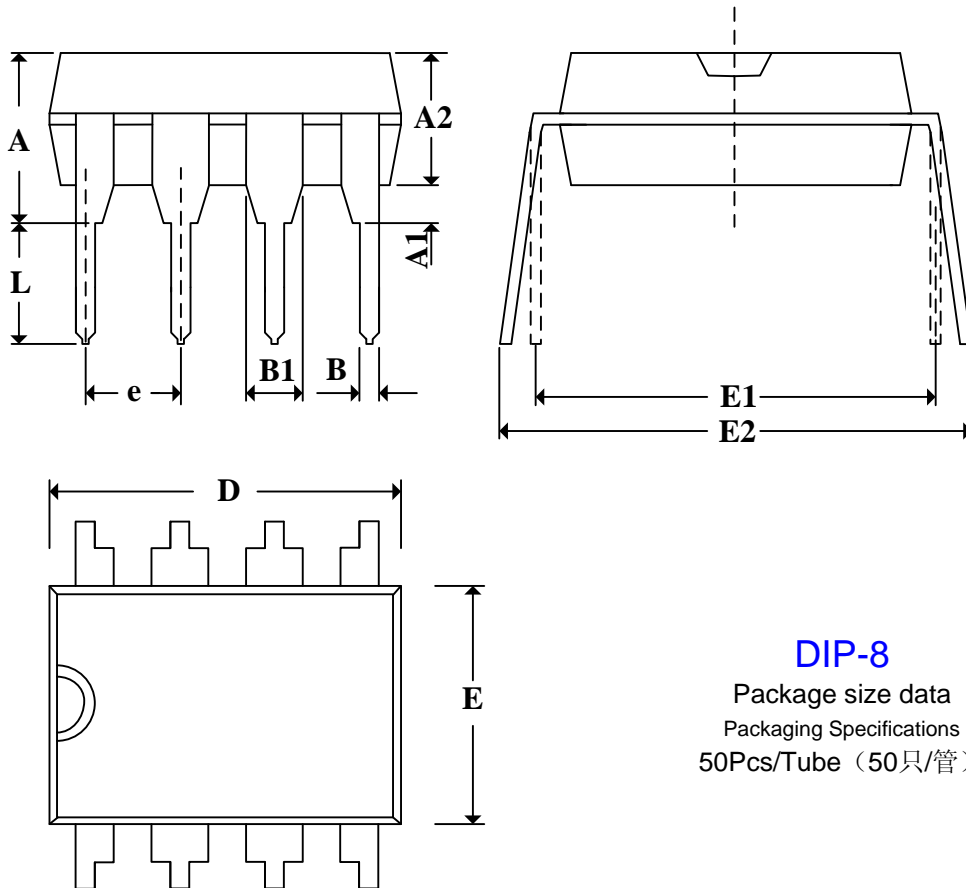


Vcc voltage generates by the constant voltage circuit in IC. This is measured not by M54122L but by a special element.





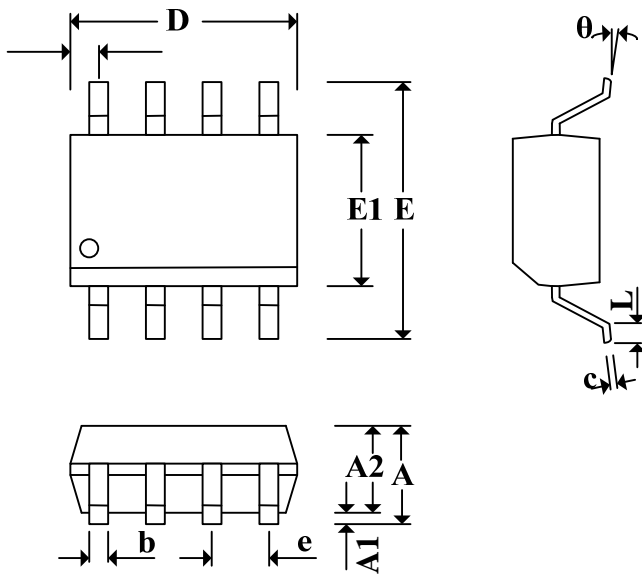
封装尺寸数据  
PACKAGE DIMENSIONS



**DIP-8**  
Package size data  
Packaging Specifications  
50Pcs/Tube (50只/管)

符 号	尺 寸(mm)		符 号	尺 寸(mm)	
	最小值	最大值		最小值	最大值
A1	0.51		e	2.54 (BSC)	
A2	3.10	3.50	D	9.05	9.45
L	3.00		E	6.15	6.55
B	0.46	0.56	E1	7.37	7.87
B1	1.524 (BSC)		E2	8.40	9.00

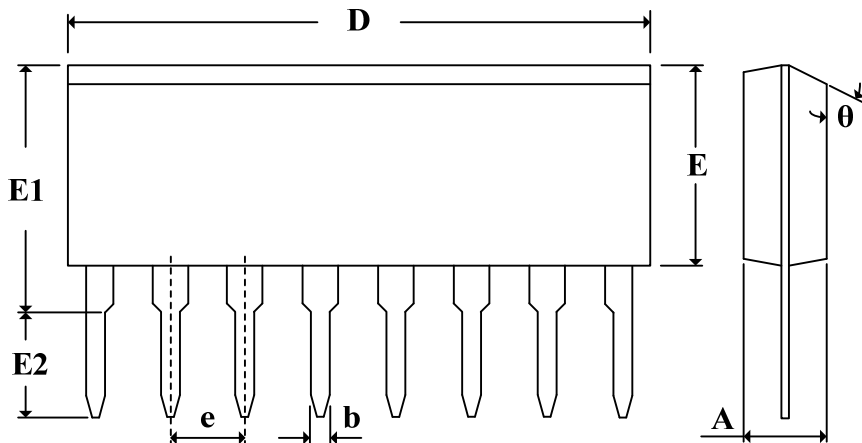




**SOP-8**

Package size data  
Packaging Specifications  
100Pcs/Tube (100只/管)

符 号	尺 寸(mm)		符 号	尺 寸(mm)	
	最小值	最大值		最小值	最大值
A1	0.075	0.275	e	1.27 (BSC)	
A2	1.20	1.60	D	4.70	5.10
L	0.55	0.75	E	5.80	6.20
$\theta$	0°	7°	E1	3.70	4.10



**SIP-8**

Package size data  
Packaging Specifications  
25Pcs/Tube (25只/管)

符 号	尺 寸(mm)		符 号	尺 寸(mm)	
	最小值	最大值		最小值	最大值
A	2.60	3.00	e	2.54 (BSC)	
D	19.00	19.40	E1	7.80	8.20
E	6.30	6.70	E2	3.30	3.50



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## 深圳市浩海電子有限公司

SHENZHEN HAOHAI ELECTRONICS CO., LTD.

2 floor(whole floor), BAOXIN Building, 0 Lane on the 8th, Yufeng Garden,  
82 District, BAOAN District, Shenzhen City, Guangdong Province, China.

公司电话 TEL: +86-755-29955080、29955081、29955082、29955083  
总机八线 29955090、29955091、29955092、29955093

FAX: +86-755-27801767

E-mail:kkg@kkg.com.cn

<http://www.szhhe.com>

<http://www.kkg.com.cn>