



复旦微电子

# ***VG54123L/P EARTH LEAKAGE CURRENT DETECTOR***

**Specification**

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**Mar. 2012**

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# Product Overview

## Description

VG54123L/P is a semiconductor integrated circuit with amplifier for a high-speed earth leakage circuit breaker. VG54123L/P is completely compatible with the M54123L.

## Features

- Wide temperature range (-20°C ~ +80°C)
- Good temperature characteristics of sensitivity current
- High input sensitivity ( $V_T = 6.1\text{mV Typ.}$ )
- Low external component count
- High noise and surge-proof
- Low power demission ( $P_d = 5\text{mW Typ.}$ )
- May be used both as 110V and 220V
- SIP8 (VG54123L), DIP8 (VG54123D), SOP8 (VG54123P)

## Function

The VG54123 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 transformers (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 Function

Pin	Symbol	Pin Function
1	$V_R$	Reference voltage
2	IN	Input
3	GND	Ground
4	OD	Differential amplifier output
5	SC	Latch input
6	NR	Terminal and noise absorption
7	OS	Output
8	$V_S$	Supply voltage

# Characteristics

## Absolute Maximum Ratings

( $T_a = -20^{\circ}\text{C} \sim +80^{\circ}\text{C}$ , unless otherwise noted)

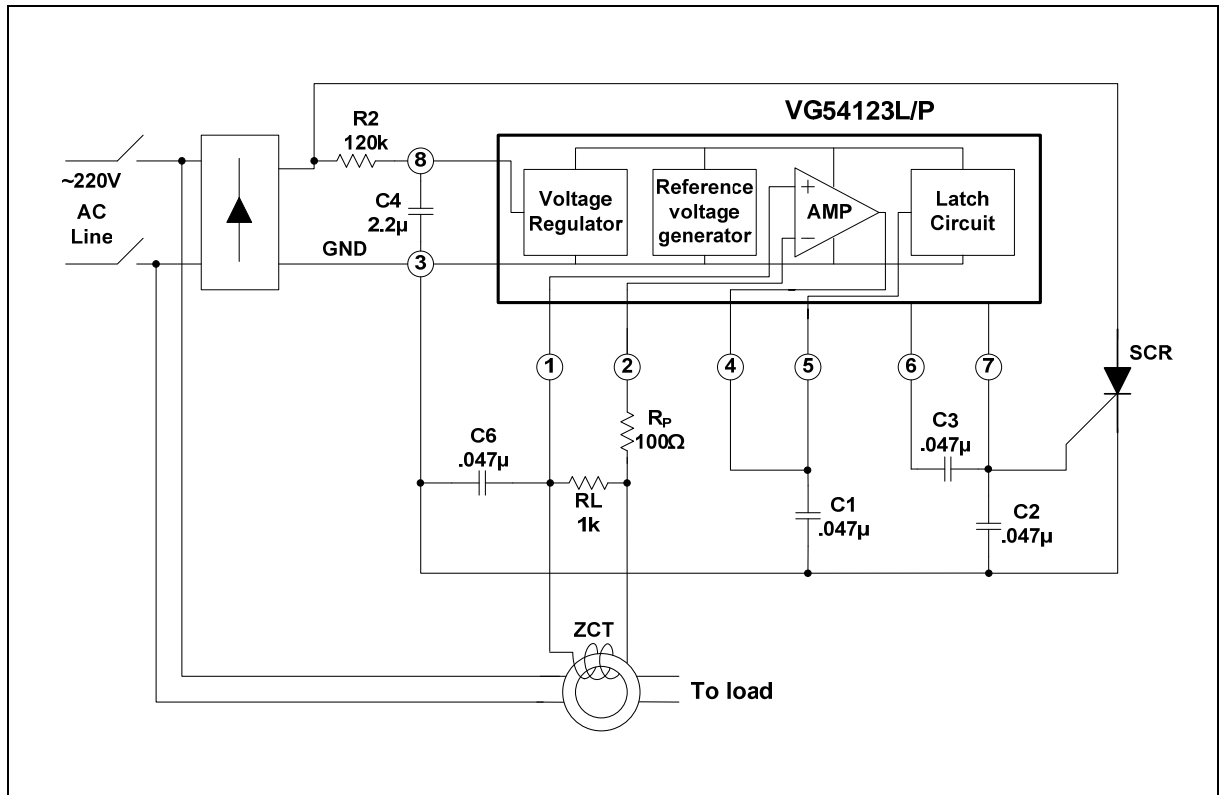
Symbol	Parameter	Conditions	Rating	Unit
$I_S$	Supply current	-	8	mA
$I_{VR}$	VR pin current	$V_R$ -IN	250	mA
		$V_R$ -GND	30	
		IN- $V_R$	-250	
$I_{IN}$	IN terminal current	IN- $V_R$	250	mA
		IN-GND	30	
		$V_R$ -IN	-250	
$I_{SC}$	SC terminal current	-	5	mA
$P_d$	Power dissipation	-	200	mW
$T_{opr}$	Operating temperature	-	-20 ~ +80	$^{\circ}\text{C}$
$T_{stg}$	Storage temperature	-	-55 ~ +125	$^{\circ}\text{C}$

## Electrical Characteristics

( $T_a = -20^{\circ}\text{C} \sim +80^{\circ}\text{C}$ , unless otherwise noted)

Symbol	Parameter	Test conditions	Temperature ( $^{\circ}\text{C}$ )	Min	Typ	Max	Unit
$I_{S1}$	Supply current	$V_S=12\text{V}$ , $V_R-V_i=30\text{mV}$	25		400	580	$\mu\text{A}$
$V_T$	Trip voltage	$V_S=12\text{V}$ , $V_R-V_i$	-20~+80	4	6.1	9	mVrms
$I_{TD1}$	Timed current1	$V_S=12\text{V}$ , $V_R-V_i=30\text{mV}$ $V_{OD}=1.2\text{V}$	25	-30		-12	$\mu\text{A}$
$I_{TD2}$	Timed current2	$V_S=12\text{V}$ , short circuit between $V_R$ and $V_i$ , $V_{OD}=0.8\text{V}$	25	17		37	$\mu\text{A}$
$I_O$	Output current	$V_{SC}=1.4\text{V}$   $I_{S1}=530\mu\text{A}$	25	-100			$\mu\text{A}$
		$V_{OS}=0.8\text{V}$   $I_{S1}=480\mu\text{A}$	80	-75			
$V_{SC}$ "ON"	Sc "ON" voltage	$V_S=12\text{V}$	25	0.7		1.4	V
$I_{SC}$ "ON"	Sc input current	$V_S=12\text{V}$	25			5	$\mu\text{A}$
$I_{OSL}$	Output low-level current	$V_S=12\text{V}$ , $V_{OSL}=0.2\text{V}$	-20~+80	200			$\mu\text{A}$
$V_{IC}$	Input clamp voltage	$V_S=12\text{V}$ , $I_{IC}=20\text{mA}$	-20~+80	4.3		6.7	V
$V_S$ "OFF"	Latch circuit is off-state supply voltage		25	0.5			V
$T_{ON}$	Operating time	$V_S=12\text{V}$ , $V_R-V_i=0.3\text{V}$	25	3		4	ms

# Application Circuit





# Revision History

Version	Publication date	Pages	Paragraph or Illustration	Revise Description
1.0	Mar. 1999	2		Initial Release.
2.0	Oct. 2007	7		Updated format.
2.1	May. 2008	7	Sales and service	Updated the address of HK office.
2.2	Mar. 2012	7	Electrical Characteristics	Corrected the Max and Min of $I_{TD1}$ in the Electrical Characteristics



## Sales and Service

### Shanghai Fudan Microelectronics Group Co., Ltd.

Address: Bldg No. 4, 127 Guotai Rd,  
Shanghai City China.

Postcode: 200433

Tel: (86-021) 6565 5050

Fax: (86-021) 6565 9115

### Shanghai Fudan Microelectronics (HK) Co., Ltd.

Address: Unit 506, 5/F., East Ocean Centre, 98 Granville Road, Tsimshatsui East, Kowloon,  
Hong Kong

Tel: (852) 2116 3288 2116 3338

Fax: (852) 2116 0882

### Beijing Office

Address: Room 423, Bldg B, Gehua Building,  
1 QingLong Hutong, Dongzhimen Alley north Street,  
Dongcheng District, Beijing City, China.

Postcode: 100007

Tel: (86-10) 8418 6608 8418 7486

Fax: (86-10) 8418 6211

### Shenzhen Office

Address: Room.1301, Century Bldg, Shengtingyuan Hotel, Huaqiang Rd (North),  
Shenzhen City, China.

Postcode: 518028

Tel: (86-0755) 8335 3211 8335 6511

Fax: (86-0755) 8335 9011

**Web Site:** <http://www.fmsb.com/>