PRELIMINARY DATA SHEET

NEC

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC1251GR-9LG, 358GR-9LG

LOW POWER DUAL OPERATIONAL AMPLIFIERS

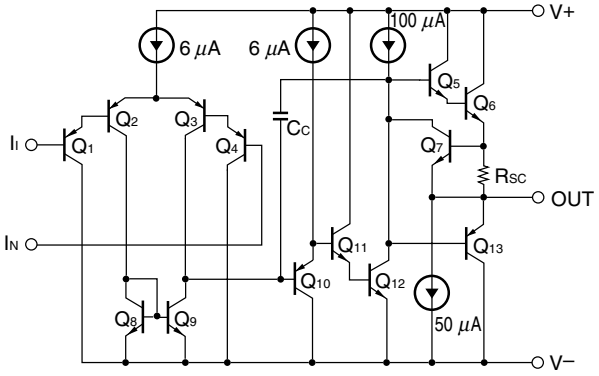
DESCRIPTION

The μPC1251GR-9LG, 358GR-9LG are dual operational amplifiers which are designed to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the power supply current drain is very low. Further advantage, the input commonmode voltage range includes ground in the linear mode.

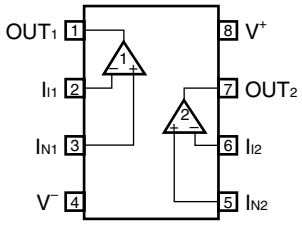
FEATURES

- Internally frequency compensation
- Wide output voltage swing V^- to V^+ – 1.5 V
- Common mode input voltage range includes V^-
- Wide supply voltage range
  - 3 V to 30 V (Single)
  - ±1.5 V to ±15 V (Split)
- Output short circuit protection

EQUIVALENT CIRCUIT (1/2 Circuit)



PIN CONFIGURATION (Marking Side)



ORDERING INFORMATION

Part Number	Package
μPC1251GR-9LG-A	8-pin plastic TSSOP (5.72 mm (225))
μPC1251GR(5)-9LG-A	8-pin plastic TSSOP (5.72 mm (225))
μPC358GR-9LG-A	8-pin plastic TSSOP (5.72 mm (225))
μPC358GR(5)-9LG-A	8-pin plastic TSSOP (5.72 mm (225))

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ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Parameter	Symbol	μPC1251GR-9LG	μPC358GR-9LG	Unit
Voltage between V^+ and V^- Note 1	$V^+ - V^-$	−0.3 to +32		V
Differential Input Voltage	V_{ID}	±32		V
Input Voltage Note 2	V_I	V^- − 0.3 to V^- + 32		V
Output Voltage Note 3	V_O	V^- − 0.3 to V^+ + 0.3		V
Power Dissipation Note 4	P_T	440		mW
Output Short Circuit Duration Note 5		Indefinite		s
Operating Ambient Temperature	T_A	−40 to +125	−40 to +85	°C
Storage Temperature	T_{stg}	−55 to +150	−55 to +125	°C

Notes 1. Reverse connection of supply voltage can cause destruction.

2. The input voltage should be allowed to input without damage or destruction independent of the magnitude of V^+. Either input signal should not be allowed to go negative by more than 0.3 V. The normal operation will establish when the both inputs are within the Common Mode Input Voltage Range of electrical characteristics.

3. This specification is the voltage which should be allowed to supply to the output terminal from external without damage or destructive. Even during the transition period of supply voltage, power on/off etc., this specification should be kept. The output voltage of normal operation will be the Output Voltage Swing of electrical characteristics.

4. The thermal deleting factor of these IC are same value as −5.5mW/°C, but the delete beginning temperature in different as follows.

μPC1251GR-9LG : 69°C μPC358GR-9LG : 44°C

The calculated junction to ambient thermal resistance at above conditions is 183°C/W.

5. Pay careful attention to the total power dissipation not to exceed the absolute maximum ratings, Note 4.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Supply Voltage (Split)	$V^{\pm}$	±1.5		±15	V
Supply Voltage (V^- = GND)	V^+	+3		+30	V

μPC1251GR-9LG, μPC358GR-9LG

ELECTRICAL CHARACTERISTICS (T_A = 25 °C, V^+ = +5 V, V^- = GND)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Offset Voltage	V_{IO}	R_S = 0 Ω		±2	±7	mV
Input Offset Current	I_{IO}			±5	±50	nA
Input Bias Current Note 6	I_B			45	250	nA
Large Signal Voltage Gain	A_V	R_L ≥ 2 kΩ	25	100		V/mA
Supply Current Note 7	I_{CC}	R_L = ∞, I_O = 0 A		0.7	1.2	mA
Common Mode Rejection Ratio	CMR		65	70		dB
Supply Voltage Rejection Ratio	SVR		65	100		dB
Output Voltage Swing	V_O	R_L = 2 kΩ (Connect to GND)	0		V^+ – 1.5	V
Common Mode Input Voltage Range	V_{ICM}		0		V^+ – 1.5	V
Output Current (SOURCE)	$I_{O\ SOURCE}$	V_{IN}^+ = +1 V, V_{IN}^- = 0 V	20	40		mA
Output Current (SINK)	$I_{O\ SINK}$	V_{IN}^- = +1 V, V_{IN}^+ = 0 V	10	20		mA
		V_{IN}^- = +1 V, V_{IN}^+ = 0 V, V_O = 200 mV	12	50		μA
Channel Separation		f = 1 kHz to 20 kHz		120		dB

Notes 6. Input bias currents flow out from IC. Because each currents are base current of PNP-transistor on input stage.

7. This current flows irrespective of the existence of use.

μPC1251GR(5)-9LG, μPC358GR(5)-9LG

ELECTRICAL CHARACTERISTICS (T_A = 25 °C, V^+ = +5 V, V^- = GND)

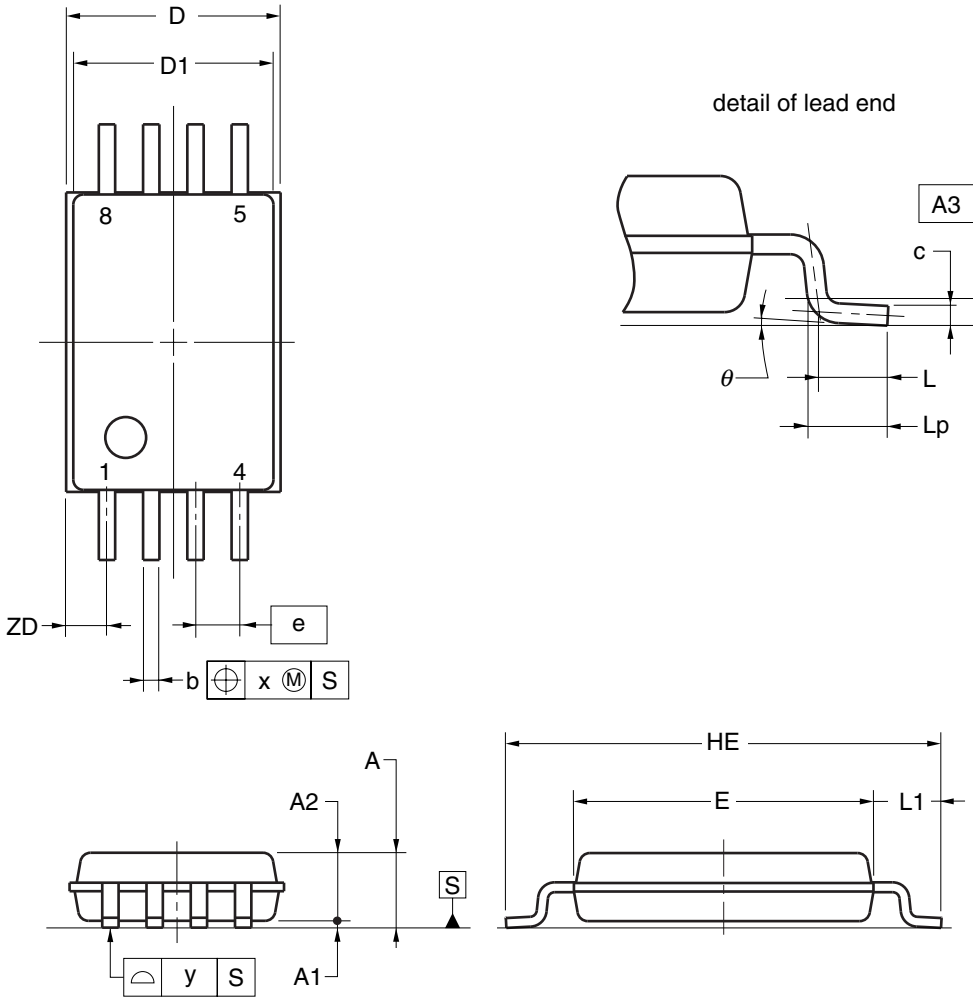
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Offset Voltage	V_{IO}	R_S = 0 Ω		±2	±3	mV
Input Offset Current	I_{IO}			±5	±50	nA
Input Bias Current Note 6	I_B			45	60	nA
Large Signal Voltage Gain	A_V	R_L ≥ 2 kΩ	50	100		V/mA
Supply Current Note 7	I_{CC}	R_L = ∞, I_O = 0 A		0.7	0.9	mA
Common Mode Rejection Ratio	CMR		65	70		dB
Supply Voltage Rejection Ratio	SVR		65	100		dB
Output Voltage Swing	V_O	R_L = 2 kΩ (Connect to GND)	0		V^+ – 1.5	V
Common Mode Input Voltage Range	V_{ICM}		0		V^+ – 1.4	V
Output Current (SOURCE)	$I_{O\ SOURCE}$	V_{IN}^+ = +1 V, V_{IN}^- = 0 V	30	40		mA
Output Current (SINK)	$I_{O\ SINK}$	V_{IN}^- = +1 V, V_{IN}^+ = 0 V	15	20		mA
		V_{IN}^- = +1 V, V_{IN}^+ = 0 V, V_O = 200 mV	30	50		μA
Channel Separation		f = 1 kHz to 20 kHz		120		dB

Notes 6. Input bias currents flow out from IC. Because each currents are base current of PNP-transistor on input stage.

7. This current flows irrespective of the existence of use.

PACKAGE DRAWING

8-PIN PLASTIC TSSOP (5.72mm (225))



(UNIT:mm)

ITEM	DIMENSIONS
D	3.15±0.15
D1	3.00±0.10
E	4.40±0.10
HE	6.40±0.20
A	1.20 MAX.
A1	0.10±0.05
A2	1.00±0.05
A3	0.25
b	$0.24^{+0.06}_{-0.05}$
c	0.145±0.055
L	0.50
Lp	0.60±0.15
L1	1.00±0.20
θ	$3^{\circ}{}^{+5^{\circ}}_{-3^{\circ}}$
e	0.65
x	0.10
y	0.10
ZD	0.60

P8GR-65-9LG

NOTE
Each lead centerline is located within 0.10mm of its true position at maximum material condition.

RECOMMENDED SOLDERING CONDITIONS

The μPC1251GR-9LG, 358GR-9LG should be soldered and mounted under the following recommended conditions.

For soldering methods and conditions other than those recommended below, contact an NEC Electronics sales representative.

For technical information, see the following website.

Semiconductor Device Mount Manual (http://www.necel.com/pkg/en/mount/index.html)

Type of Surface Mount Device

Process	Conditions	Symbol
Infrared ray reflow	Peak temperature: 260 °C or below (Package surface temperature), Reflow time: 60 seconds or less (at 220 °C or higher), Maximum number of reflow processes: 3 time.	IR60-00-3
Wave soldering	Solder temperature: 260 °C or below, Flow time: 10 seconds or less, Maximum number of flow processes: 1 time, Pre-heating temperature: 120 °C or below (Package surface temperature).	WS60-00-1
Partial heating method	Pin temperature: 350 °C or below, Heat time: 3 seconds or less (Per each side of the device).	P350

Caution Apply only one kind of soldering condition to a device, except for "partial heating method", or the device will be damaged by heat stress.

REFERENCE DOCUMENTS

Document Name	Document No.
QUALITY GRADES ON NEC SEMICONDUCTOR DEVICES	C11531E
SEMICONDUCTOR DEVICE MOUNT MANUAL	http://www.necel.com/pkg/en/mount/index.html
NEC SEMICONDUCTOR DEVICE RELIABILITY/QUALITY CONTROL SYSTEM - STANDARD LINEAR IC	IEI-1212

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