

To our customers,

Old Company Name in Catalogs and Other Documents

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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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**HIGH CMR, ANALOG OUTPUT TYPE
OPTICAL COUPLED ISOLATION AMPLIFIER** –NEPOC Series–

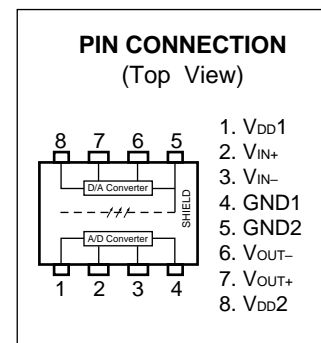
DESCRIPTION

The PS8551L4 is an optical coupled isolation amplifier that uses an IC provided with a high-accuracy A/D conversion function (sigma-delta modulation method) and a GaAlAs light-emitting diode with high-speed response and high luminance efficiency on the input side. On the output side IC provided with a high-accuracy D/A conversion function.

The PS8551L4 is designed specifically for high common mode transient immunity (CMR) and high linearity (non-linearity). The PS8551L4 is suitable for current sensing in motor drives.

FEATURES

- Non-linearity (NL200 = 0.35% MAX.)
- High common mode transient immunity (CMR = 10 kV/ μ S MIN.)
- High isolation voltage (BV = 5 000 Vr.m.s.)
- Gain tolerance (Δ G = \pm 3%)
Gain: 8 V/V
- Package: 8-pin DIP lead bending type (Gull-wing) for long creepage distance for surface mount (L4)
- Pb-Free product
- Safety standards
 - UL approved: File No. E72422
 - CSA approved: No. CA 101391
 - BSI approved: No. 8937, 8938
 - SEMKO approved: No. 615433
 - NEMKO approved: No. P06207243
 - DEMKO approved: No. 314091
 - FIMKO approved: No. FI 22827
 - DIN EN60747-5-2 (VDE0884 Part2) approved (Option)



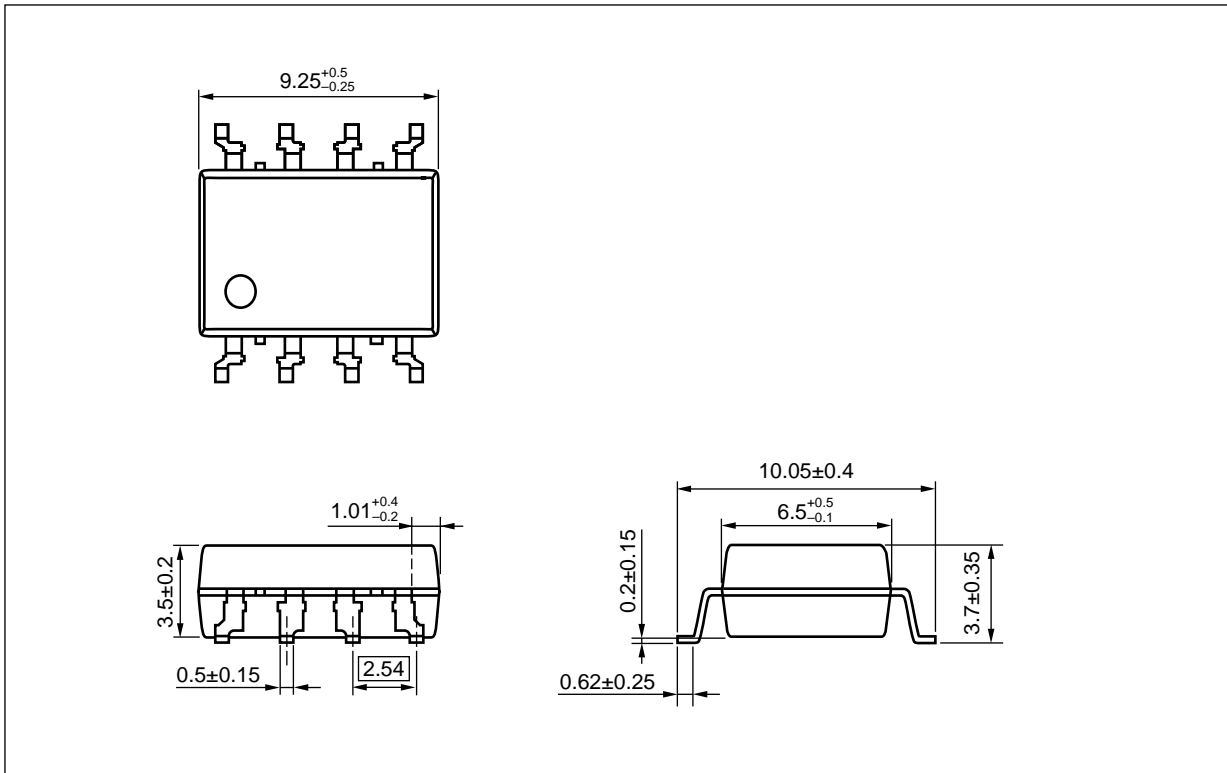
APPLICATIONS

- AC Servo, inverter
- Measurement equipment

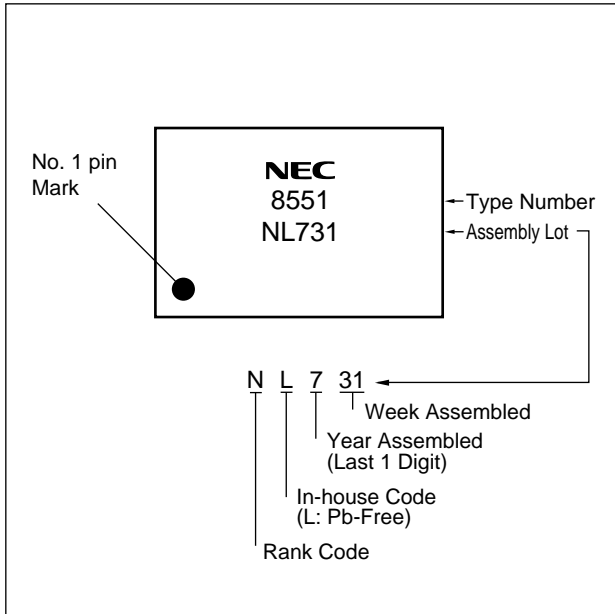
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PACKAGE DIMENSIONS (UNIT: mm)

Lead Bending Type(Gull-wing) For Long Creepage Distance For Surface Mount (L4)



MARKING EXAMPLE



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

Parameter	Symbol	Ratings	Unit
Operating Ambient Temperature	T _A	-40 to 85	°C
Storage Temperature	T _{stg}	-55 to 125	°C
Supply Voltage	V _{DD1} , V _{DD2}	0 to 5.5	V
Input Voltage	V _{IN+} , V _{IN-}	-2 to V _{DD1} +0.5	V
2 Seconds Transient Input Voltage	V _{IN+} , V _{IN-}	-6 to V _{DD1} +0.5	V
Output Voltage	V _{OUT+} , V _{OUT-}	-0.5 to V _{DD2} +0.5	V.
Isolation Voltage ^{*1}	BV	5000	Vr.m.s.

*1 AC voltage for t = 1 minute at T_A = 25°C RH = 60% between input and output. Pins 1-4 shorted together, 5-8 shorted together.

RECOMMENDED OPERATING CONDITIONS (T_A = 25°C, unless otherwise specified)

Parameter	Symbol	MIN.	MAX.	Unit
Operating Ambient Temperature	T _A	-40	85	°C
Supply Voltage	V _{DD1} , V _{DD2}	4.5	5.5	V
Input Voltage (Accurate and Linear)	V _{IN+} , V _{IN-}	-200	200	mV

ELECTRICAL CHARACTERISTICS (DC Characteristics)

(TYP.: $T_A = 25^\circ\text{C}$, $V_{IN+} = V_{IN-} = 0\text{ V}$, $V_{DD1} = V_{DD2} = 5\text{ V}$,

MIN., MAX.: within recommended operating conditions, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input Offset Voltage	V_{os}	$T_A = 25^\circ\text{C}$	-2	0.3	2	mV
			-3		3	
Input Offset Voltage Drift vs. Temperature	$ dV_{os}/dT_A $	$T_A = 25\text{ to }+85^\circ\text{C}$		3	10	$\mu\text{V}/^\circ\text{C}$
Gain	G	$-200\text{ mV} \leq V_{IN+} \leq 200\text{ mV}$, $T_A = 25^\circ\text{C}$	7.76	8	8.24	V/V
V_{OUT} Gain Drift vs. Temperature	$ dG/dT_A $			0.00087		$\text{V}/\text{V}/^\circ\text{C}$
V_{OUT} Non-linearity (200 mV) *1	NL200	$-200\text{ mV} \leq V_{IN+} \leq 200\text{ mV}$		0.021	0.35	%
V_{OUT} Non-linearity (200 mV) Drift vs. Temperature	$ dNL200/dT_A $			0.0002		$\%/^\circ\text{C}$
V_{OUT} Non-linearity (100 mV) *1	NL100	$-100\text{ mV} \leq V_{IN+} \leq 100\text{ mV}$		0.014	0.2	%
Maximum Input Voltage before V_{OUT} Clipping	$ V_{IN+} \text{ MAX.}$			308		mV
Input Supply Current	I_{DD1}	$V_{IN+} = 400\text{ mV}$		16	20	mA
Output Supply Current	I_{DD2}	$V_{IN+} = -400\text{ mV}$		10	16	mA
Input Bias Current	I_{IN+}	$V_{IN+} = 0\text{ V}$		-0.5	5	μA
Input Bias Current Drift vs. Temperature	$ dI_{IN+}/dT_A $			0.45		$\text{nA}/^\circ\text{C}$
Low Level Saturated Output Voltage	V_{OL}	$V_{IN+} = -400\text{ mV}$		1.29		V
High Level Saturated Output Voltage	V_{OH}	$V_{IN+} = 400\text{ mV}$		3.8		V
Output Voltage ($V_{IN+} = V_{IN-} = 0\text{ V}$)	V_{OCM}	$V_{IN+} = V_{IN-} = 0\text{ V}$	2.2	2.55	2.8	V
Output Short-circuit Current	$ I_{osc} $			18.6		mA
Equivalent Input Resistance	R_{IN}			320		$\text{k}\Omega$
V_{OUT} Output Resistance	R_{OUT}			15		Ω
Input DC Common-Mode Rejection Ratio*2	CMRR_{IN}			76		dB

*1 Non-linearity : [Half of peak-peak (of) output voltage deviation from best fit line] ÷ [Full-scale differential output voltage] (%).

*2 CMRR_{IN} is defined as the ratio of the differential signal gain (apply the differential signal between V_{IN+} and V_{IN-}) to the isolation-mode gain (connect both input pins to GND1 and apply the signal between (PS8551L4's) input and output) at 60 Hz. This value is indicated in dB.

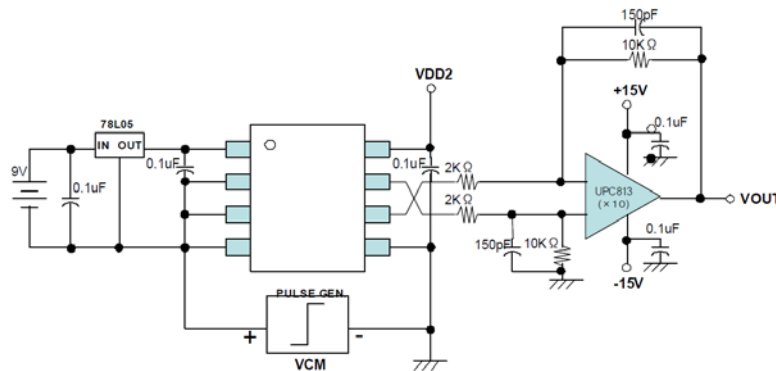
ELECTRICAL CHARACTERISTICS (AC Characteristics)

(TYP.: $T_A = 25^\circ\text{C}$, $V_{IN+} = V_{IN-} = 0\text{ V}$, $V_{DD1} = V_{DD2} = 5\text{ V}$,

MIN., MAX.: within recommended operating conditions, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
V_{OUT} Bandwidth (-3dB)	f_c	$V_{IN+} = 200\text{ V}_{p-p}$, sine wave	50	100		kHz
V_{OUT} Noise	N_{OUT}	$V_{IN+} = 0\text{ V}$		31.5		mVr.m.s.
V_{IN} to V_{OUT} Signal Delay (50 to 10%)	t_{PD10}	$V_{IN+} = 0$ to 150 mV step		2.03	3.3	μs
V_{IN} to V_{OUT} Signal Delay (50 to 50%)	t_{PD50}			4.01	5.6	
V_{IN} to V_{OUT} Signal Delay (50 to 90%)	t_{PD90}			6.02	9.9	
V_{OUT} Rise Time/Fall Time (10 to 90%)	t_r/t_f	$V_{IN+} = 0$ to 150 mV step		3.53	6.6	μs
Common Mode Transient Immunity ^{*1}	CMTI	$V_{CM} = 0.5\text{ kV}$, $T_A = 25^\circ\text{C}$	10	25		$\text{kV}/\mu\text{s}$
Power Supply Noise Rejection ^{*2}	PSR	$f = 1\text{ MHz}$		100		mVr.m.s.

*1 CMR is tested by applying steep rise/fall time(s) (20 ns) voltage step between (PS8551L4's) input and output. The voltage steps is amplified until the differential output voltage (V_{OUT+} , V_{OUT-}) reaches more than 200 mV ($> 1\ \mu\text{s}$) deviation from the average output voltage.



*2 This is the value of the transient voltage at the differential output when 1 V_{p-p} , 1 MHz, and 40 ns rise/fall time(s) square wave is applied to both V_{DD1} and V_{DD2} .

USAGE CAUTIONS

1. This product is weak for static electricity by designed with high-speed integrated circuit so protect against static electricity when handling.
2. Board Design
 - (1) By-pass capacitor of more than 0.1 μF is used between V_{DD} and GND near device. Also, ensure that the distance between the leads of the photocoupler and capacitor is no more than 10 mm.
 - (2) Make sure the distance between input terminal (V_{IN+} and V_{IN-}) of PS8551 and the devices (or components) to be connected is as close as possible.
 - (3) Make sure the distance between output terminal (V_{OUT+} and V_{OUT-}) of PS8551 and the devices (or components) to be connected is as close as possible.
3. Avoid storage at a high temperature and high humidity.

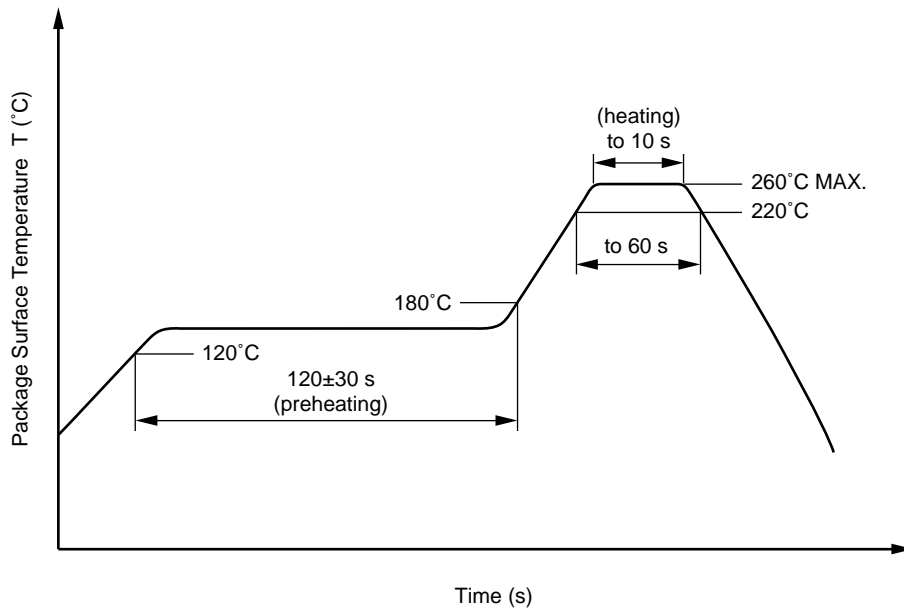
NOTES ON HANDLING

1. Recommended soldering conditions

(1) Infrared reflow soldering

- Peak reflow temperature 260°C or below (package surface temperature)
- Time of peak reflow temperature 10 seconds or less
- Time of temperature higher than 220°C 60 seconds or less
- Time to preheat temperature from 120 to 180°C 120±30 s
- Number of reflows Three
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

Recommended Temperature Profile of Infrared Reflow



(2) Wave soldering

- Temperature 260°C or below (molten solder temperature)
- Time 10 seconds or less
- Preheating conditions 120°C or below (package surface temperature)
- Number of times One (Allowed to be dipped in solder including plastic mold portion.)
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(3) Soldering by soldering iron

- Peak temperature (lead part temperature) 350°C or below
- Time (each pins) 3 seconds or less
- Flux Rosin flux containing small amount of chlorine (The flux with a maximum chlorine content of 0.2 Wt% is recommended.)

(a) Soldering of leads should be made at the point 1.5 to 2.0 mm from the root of the lead.

(b) Please be sure that the temperature of the package would not be heated over 100°C.

(4) Cautions

- Fluxes

Avoid removing the residual flux with freon-based and chlorine-based cleaning solvent.

2. Cautions regarding noise

Be aware that when voltage is applied suddenly between the photocoupler's input and output at startup, the output side may enter the on state, even if the voltage is within the absolute maximum ratings.

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