RNB4580 Series

Dual Low Noise Operational Amplifier

REA03D0004-0100
Rev.1.00
Dec 25, 2006

Description

RNB4580 is dual bipolar low noise amplifiers designed for audio systems to improve tone control, audio pre-amplifier and industrial measurement tools. It also suitable for head phone amplifier at higher output current.

This product features internal frequency compensation, low noise, low distortion, high gain and high bandwidth. It also can operate under dual power supply voltage up to ±18 V or single power supply up to 36 V.

The IC can be applied for the handy type set operational amplifier of general purpose in application of low voltage single supply type, which is properly biased of the input low voltage source.

Features

- Wide bandwidth: 15 MHz
- High speed: 7 V/µs
- Low input noise voltage: 0.7 µVrms
- Large DC voltage gain: 110 dB
- Operating voltage: ±2 V to ±18 V
- Package outline available in Pb free lead frame:
  DP-8
  SOP-8 (JEITA)
  SOP-8 (JEDEC)

Applications

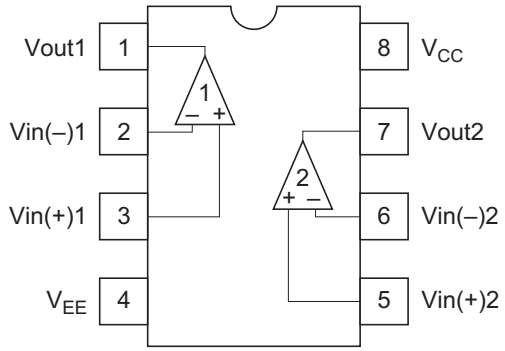
- Audio AC-3 decoder system
- Audio amplifier
- Pre-amp
- Active filter

Ordering Information

Type No.	Application	Package Code (Package Name)
RNB4580	Commercial use	PRDP0008AF-B (DP-8FV)
RNB4580F		PRSP0008DE-B (FP-8DGV)
RNB4580RP		PRSP0008DD-C (FP-8DCV)

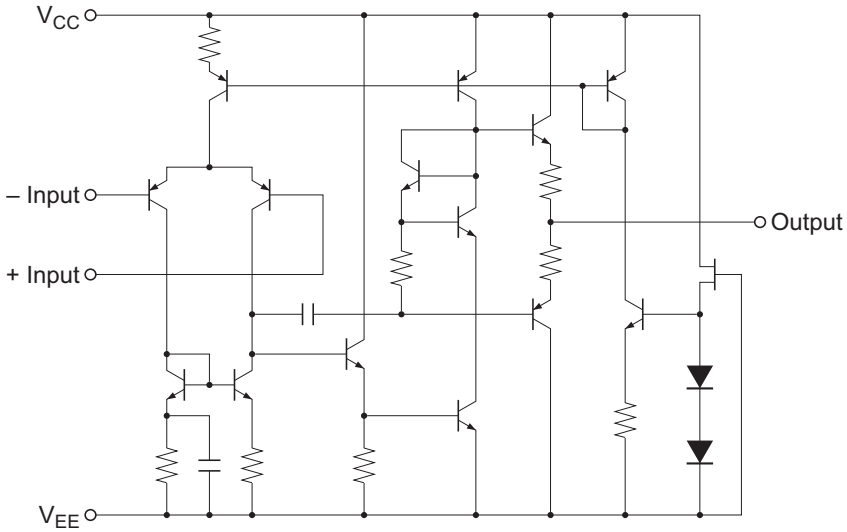
Note: This product is designed for consumer use and not for automotive.

Pin Arrangement



(Top view)

Circuit Schematic (1/2)



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings			Unit
		RNB4580	RNB4580F	RNB4580RP	
Supply Voltage	V_{CC}	18	18	18	V
	V_{EE}	–18	–18	–18	V
Differential input voltage	V_{IN} (diff)	±30	±30	±30	V
Common mode input voltage	V_{CM} *3	±15	±15	±15	V
Power dissipation	P_T	670 *1	385 *2	385 *2	mW
Operating temperature	Topr	–40 to +85	–40 to +85	–40 to +85	°C
Storage temperature	Tstg	–55 to +125	–55 to +125	–55 to +125	°C

Notes: 1. This is the allowable value up to Ta = 45°C. Derate by 8.3 mW/°C above that temperature.
2. These are the allowable values up to Ta = 60°C mounting on 40mm × 40mm × 1.6mm (t) 10% wiring density glass epoxy board. Derate by 5.9 mW/°C above that temperature.
3. If the supply voltage is less than ±15 V, input voltage should be less than supply voltage.

Electrical Characteristics

(Ta = 25°C, V_{CC} = +15 V, V_{EE} = –15 V, unless otherwise specified)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	V_{IO}	—	0.5	3	mV	$R_S \leq 10$ kΩ
Input offset current	I_{IO}	—	5	100	nA	
Input bias current	I_{IB}	—	150	500	nA	
Supply current	I_{CC}	—	4	7	mA	
Power supply rejection ratio	PSRR	80	110	—	dB	$R_S \leq 10$ kΩ
Voltage gain	A_V	90	110	—	dB	$R_L \geq 2$ kΩ, V_O = ±10 V
Common mode rejection ratio	CMR	80	110	—	dB	$R_S \leq 10$ kΩ, V_{CM} = 0 V to V_{CC} = –1.5 V
Output sink current	I_{OSINK}	—	80	—	mA	$V_{IN(–)}$ = 1 V, $V_{IN(+)}$ = 0 V, V_O = 2 V
Output source current	$I_{OSOURCE}$	—	45	—	mA	$V_{IN(–)}$ = 0 V, $V_{IN(+)}$ = 1 V, V_O = 2 V
Input common mode voltage range	V_{ICM}	±12	±13.5	—	V	
Slew rate	SR	—	7	—	V/μs	
Equivalent input noise voltage	V_{NI}	—	0.7	—	μVrms	RIAA, R_S = 2.2 kΩ, 30 kHz LPF
Gain bandwidth product	GBP	—	15	—	MHz	f = 10 kHz, R_L = 2 kΩ
Total harmonic distortion	THD	—	0.0005	—	%	A_V = 20 dB, V_O = 5 V, R_L = 2 kΩ, f = 1 kHz

Table of Graphs

Typical Characteristics Curves

Figure 1. Open Loop Voltage Gain vs. Frequency

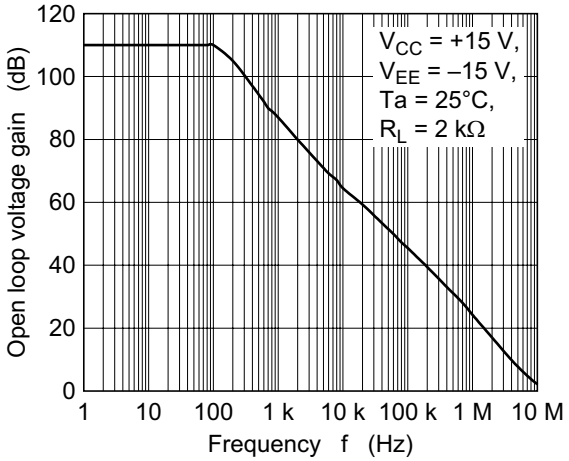


Figure 2. Output Swing Voltage vs. Frequency

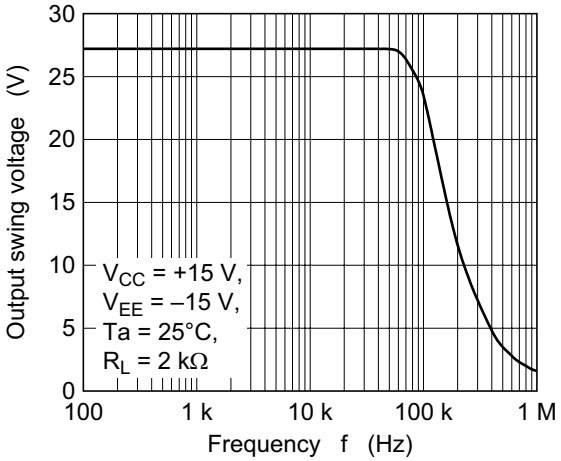


Figure 3. Output Swing Voltage vs. Load Resistance

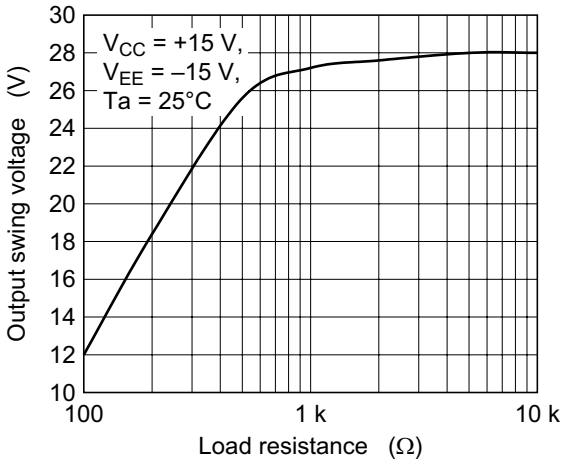


Figure 4. Equivalent Input Noise Voltage vs. Frequency

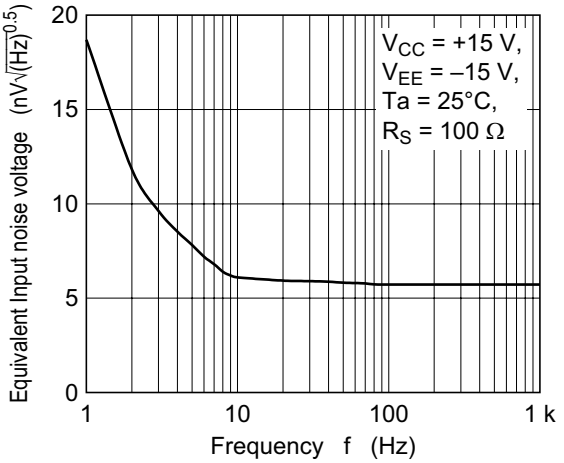


Figure 5. Input Offset Voltage vs. Temperature

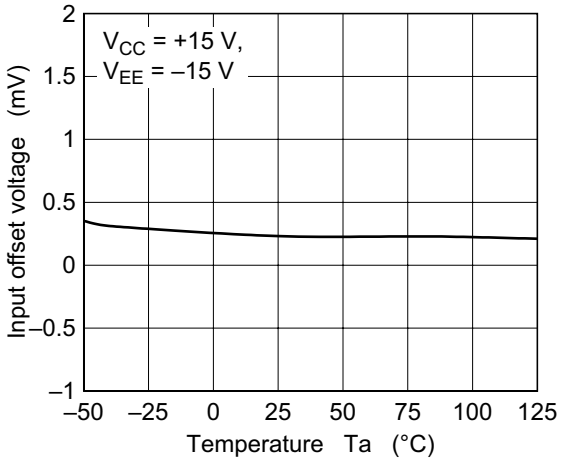
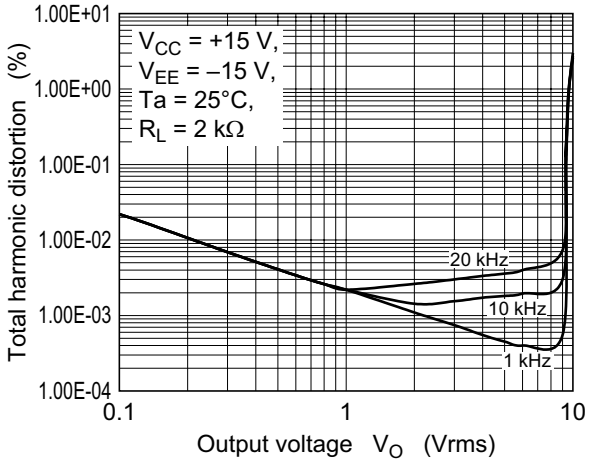


Figure 6. Total Harmonic Distortion vs. Output Voltage



Typical Characteristics Curves (cont.)

Figure 7. Maximum Output Swing Voltage vs. Operating Voltage

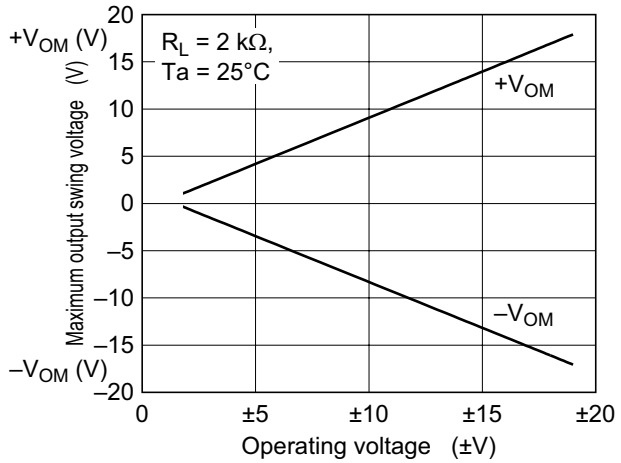
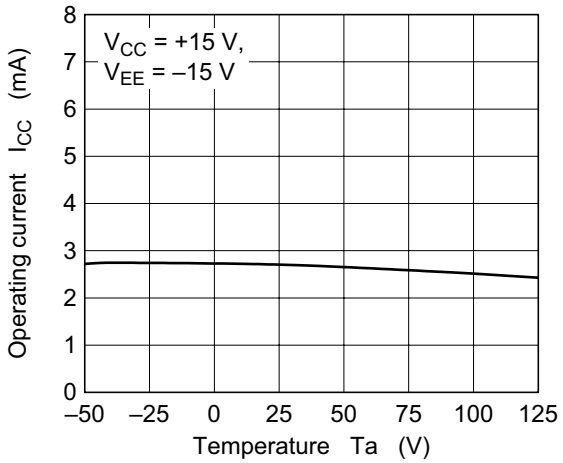
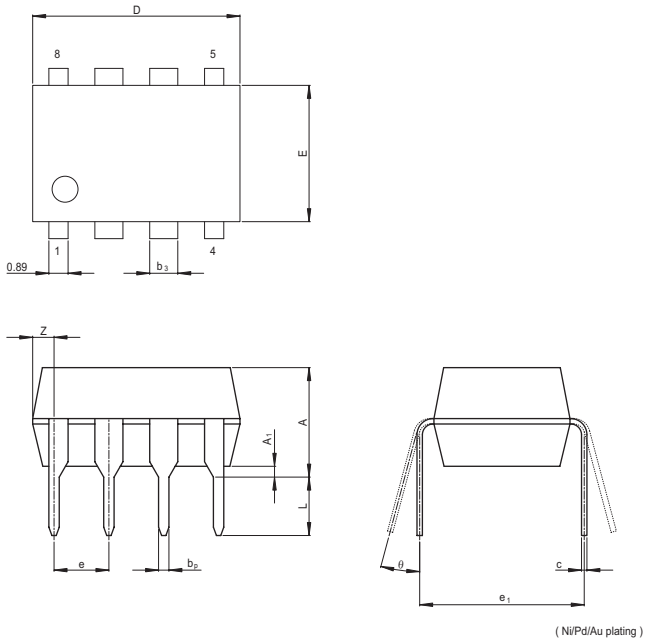


Figure 8. Operating Current vs. Temperature



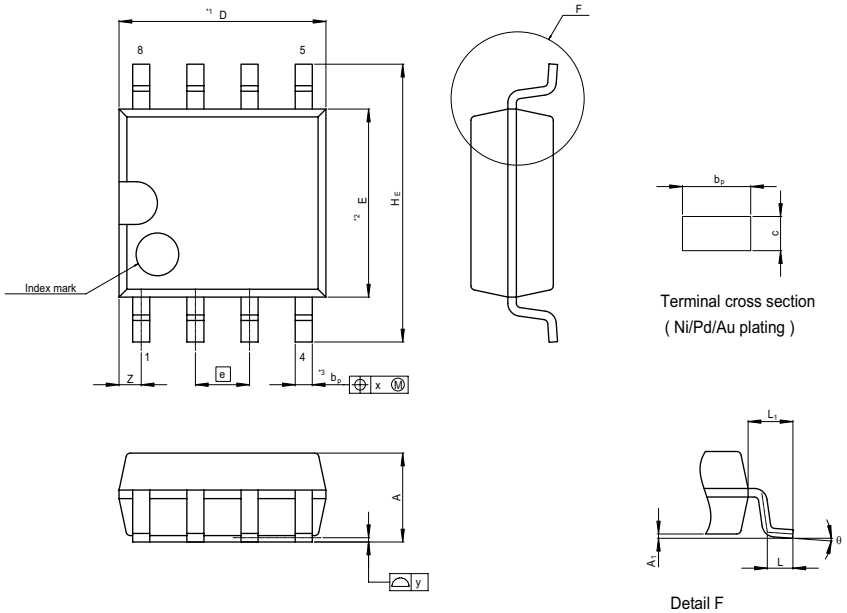
Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-DIP8-6.3x9.6-2.54	PRDP0008AF-B	DP-8FV	0.54g



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
e_1	—	7.62	—
D	—	9.60	10.6
E	—	6.30	7.4
A	—	—	5.06
A_1	0.5	—	—
b_p	0.40	0.48	0.56
b_3	—	1.30	—
c	0.19	0.25	0.31
θ	0°	—	15°
e	2.29	2.54	2.79
Z	—	—	1.27
L	2.54	—	—

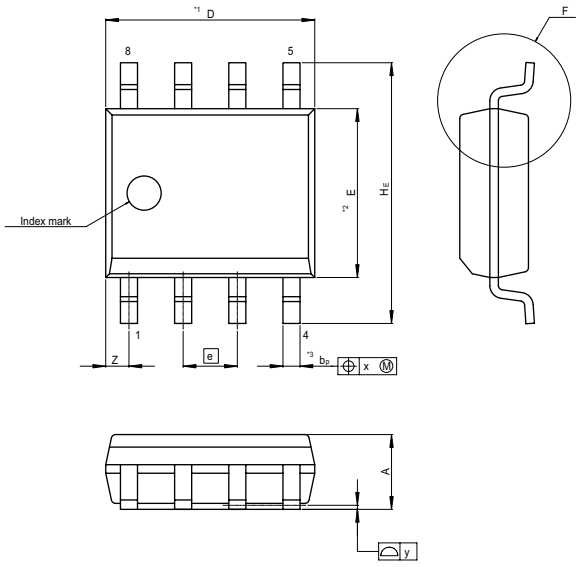
JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-4.4x4.85-1.27	PRSP0008DE-B	FP-8DGV	0.1g

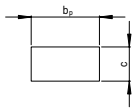


NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2" DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT INCLUDE TRIM OFFSET.

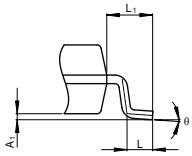
Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	4.85	5.25
E	—	4.4	—
A_2	—	—	—
A_1	0.00	0.1	0.20
A	—	—	2.03
b_p	0.35	0.4	0.45
b_1	—	—	—
c	0.15	0.20	0.25
c_1	—	—	—
θ	0°	—	8°
H_E	6.35	6.5	6.75
e	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.75
L	0.42	0.60	0.85
L_1	—	1.05	—

JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
P-SOP8-3.95x4.9-1.27	PRSP0008DD-C	FP-8DCV	0.085g





Terminal cross section
(Ni/Pd/Au plating)



Detail F

NOTE)
1. DIMENSIONS"*1 (Nom)"AND"*2"
DO NOT INCLUDE MOLD FLASH.
2. DIMENSION"*3"DOES NOT
INCLUDE TRIM OFFSET.

Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	4.90	5.30
E	—	3.95	—
A_2	—	—	—
A_1	0.10	0.14	0.25
A	—	—	1.75
b_p	0.34	0.40	0.46
b_1	—	—	—
c	0.15	0.20	0.25
c_1	—	—	—
θ	0°	—	8°
H_E	5.80	6.10	6.20
e	—	1.27	—
x	—	—	0.25
y	—	—	0.10
Z	—	—	0.75
L	0.40	0.60	1.27
L_1	—	1.08	—

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