

To our customers,

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## Old Company Name in Catalogs and Other Documents

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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# RNB4580 Series

## Dual Low Noise Operational Amplifier

REA03D0004-0200

Rev.2.00

Dec 24, 2008

### 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  $\pm 18$  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/ $\mu$ s
- Low input noise voltage: 0.7  $\mu$ Vrms
- Large DC voltage gain: 110 dB
- Operating voltage:  $\pm 2$  V to  $\pm 18$  V
- Package outline available in Pb free lead frame:
  - DP-8
  - SOP-8 (JEITA)
  - SOP-8 (JEDEC)

### Applications

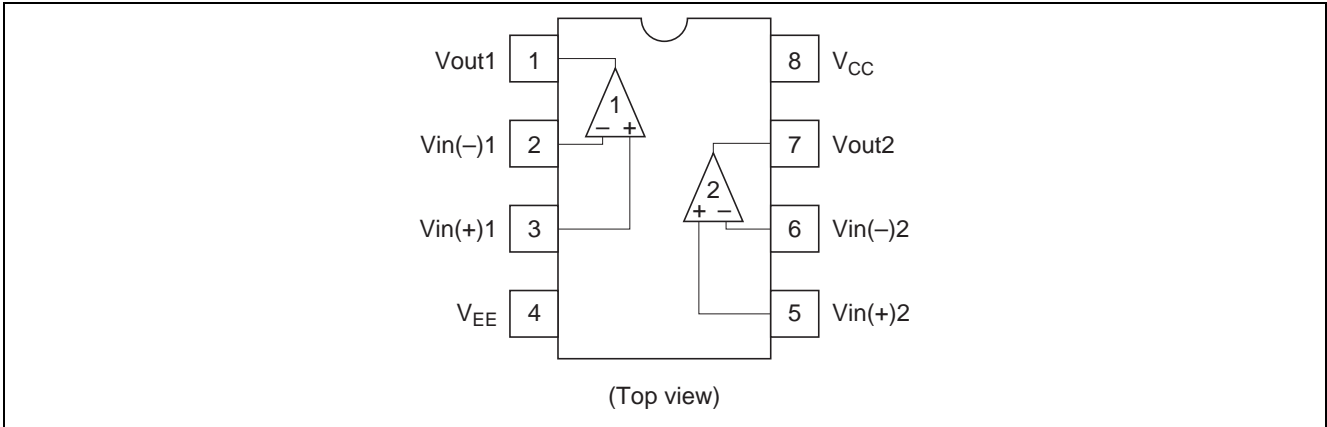
- Audio AC-3 decoder system
- Audio amplifier
- Pre-amp
- Active filter

### Ordering Information

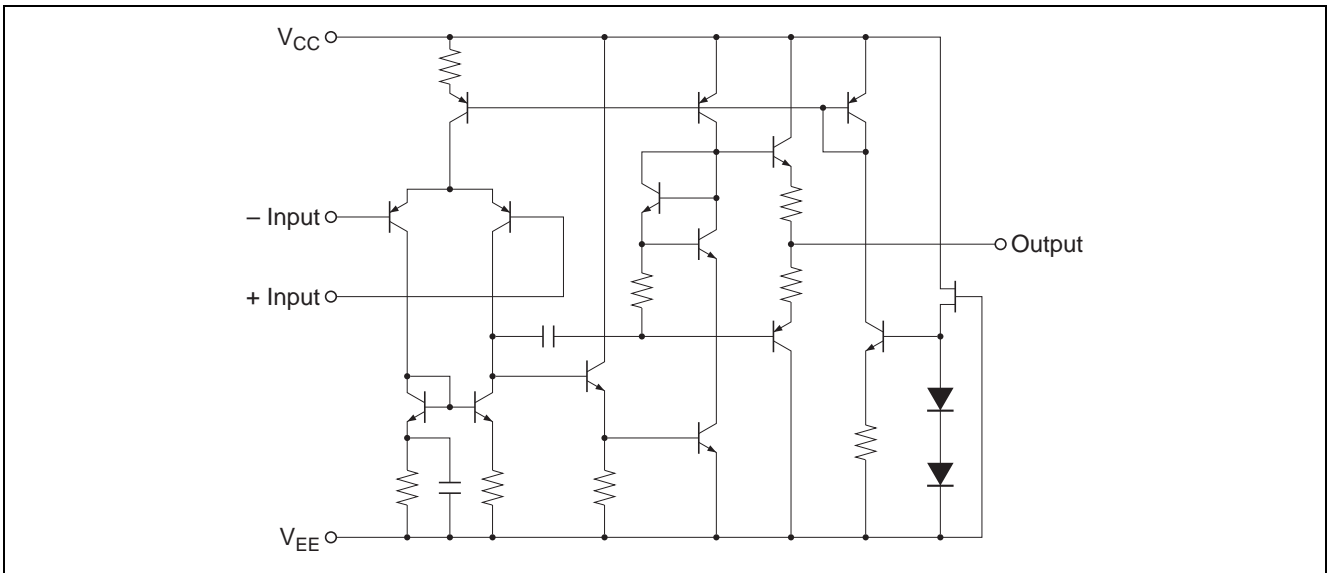
Part No.	Application	Package Code (Package Name)	Packing Abbreviation (Quantity)
RNB4580	Commercial use	PRDP0008AF-B (DP-8FV)	— (50 pcs/stick 1,000 pcs/box)
RNB4580F		PRSP0008DE-B (FP-8DGV)	EL (2,500 pcs/reel)
RNB4580RP		PRSP0008DD-C (FP-8DCV)	EL (2,500 pcs/reel)

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

### Pin Arrangement



### Circuit Schematic (1/2)



## Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Ratings			Unit
		RNB4580	RNB4580F	RNB4580RP	
Supply Voltage	V <sub>CC</sub>	18	18	18	V
	V <sub>EE</sub>	-18	-18	-18	V
Differential input voltage	V <sub>IN</sub> (diff)	±30	±30	±30	V
Common mode input voltage	V <sub>CM</sub> *3	±15	±15	±15	V
Power dissipation	P <sub>T</sub>	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

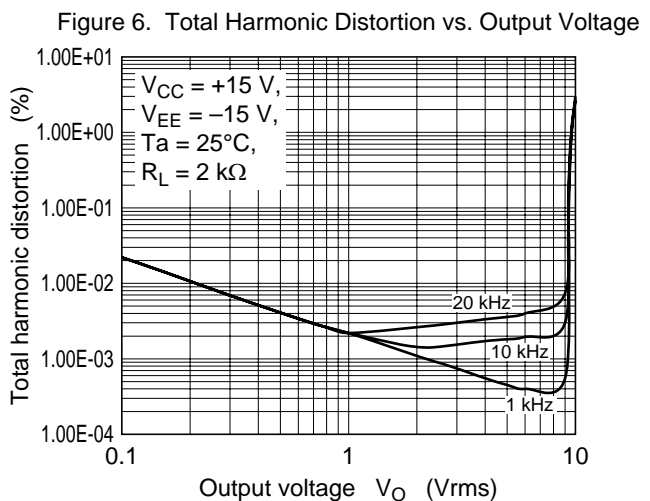
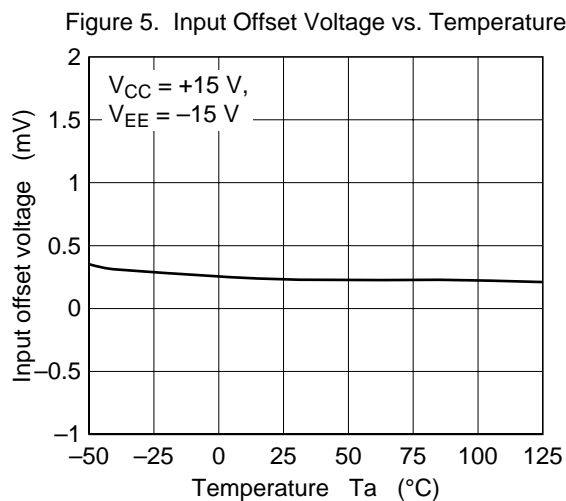
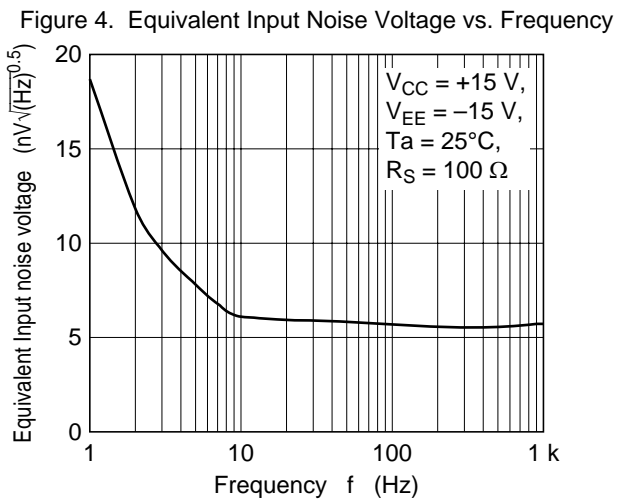
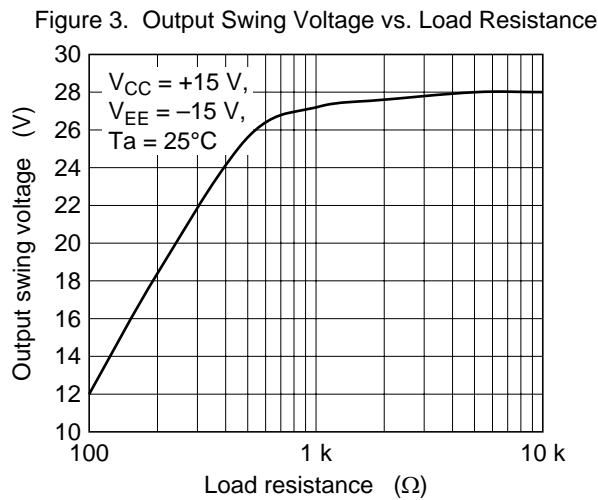
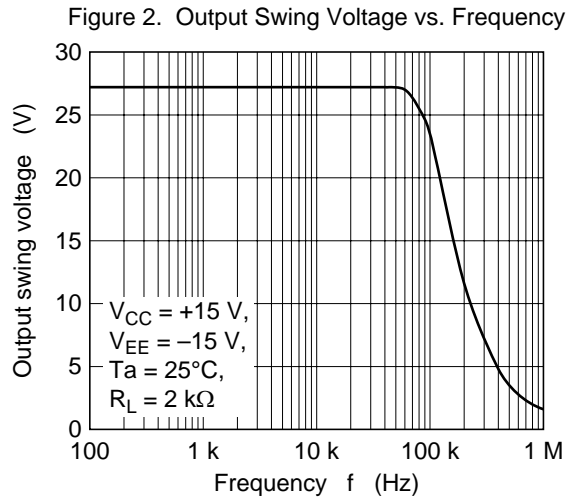
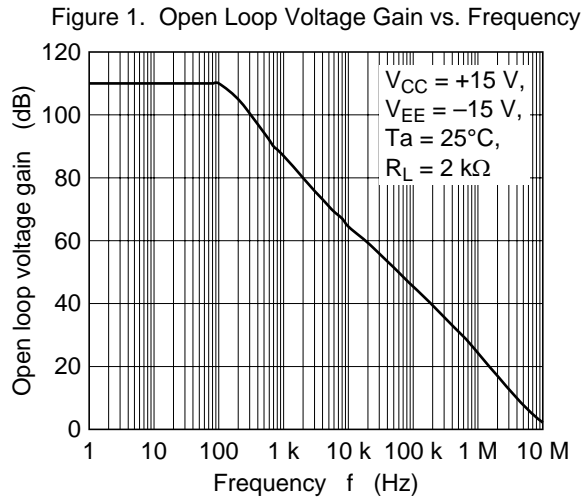
(Ta = 25°C, V<sub>CC</sub> = +15 V, V<sub>EE</sub> = -15 V, unless otherwise specified)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Input offset voltage	V <sub>IO</sub>	—	0.5	3	mV	R <sub>S</sub> ≤ 10 kΩ
Input offset current	I <sub>IO</sub>	—	5	100	nA	
Input bias current	I <sub>IB</sub>	—	150	500	nA	
Supply current	I <sub>CC</sub>	—	4	7	mA	
Power supply rejection ratio	PSRR	80	110	—	dB	R <sub>S</sub> ≤ 10 kΩ
Voltage gain	A <sub>V</sub>	90	110	—	dB	R <sub>L</sub> ≥ 2 kΩ, V <sub>O</sub> = ±10 V
Common mode rejection ratio	CMR	80	110	—	dB	R <sub>S</sub> ≤ 10 kΩ, V <sub>CM</sub> = 0 V to V <sub>CC</sub> = -1.5 V
Output sink current	I <sub>OSINK</sub>	—	80	—	mA	V <sub>IN(-)</sub> = 1 V, V <sub>IN(+)</sub> = 0 V, V <sub>O</sub> = 2 V
Output source current	I <sub>OSOURCE</sub>	—	45	—	mA	V <sub>IN(-)</sub> = 0 V, V <sub>IN(+)</sub> = 1 V, V <sub>O</sub> = 2 V
Input common mode voltage range	V <sub>ICM</sub>	±12	±13.5	—	V	
Slew rate	SR	—	7	—	V/μs	
Equivalent input noise voltage	V <sub>NI</sub>	—	0.7	—	μV <sub>rms</sub>	RIAA, R <sub>S</sub> = 2.2 kΩ, 30 kHz LPF
Gain bandwidth product	GBP	—	15	—	MHz	f = 10 kHz, R <sub>L</sub> = 2 kΩ
Total harmonic distortion	THD	—	0.0005	—	%	A <sub>V</sub> = 20 dB, V <sub>O</sub> = 5 V, R <sub>L</sub> = 2 kΩ, f = 1 kHz

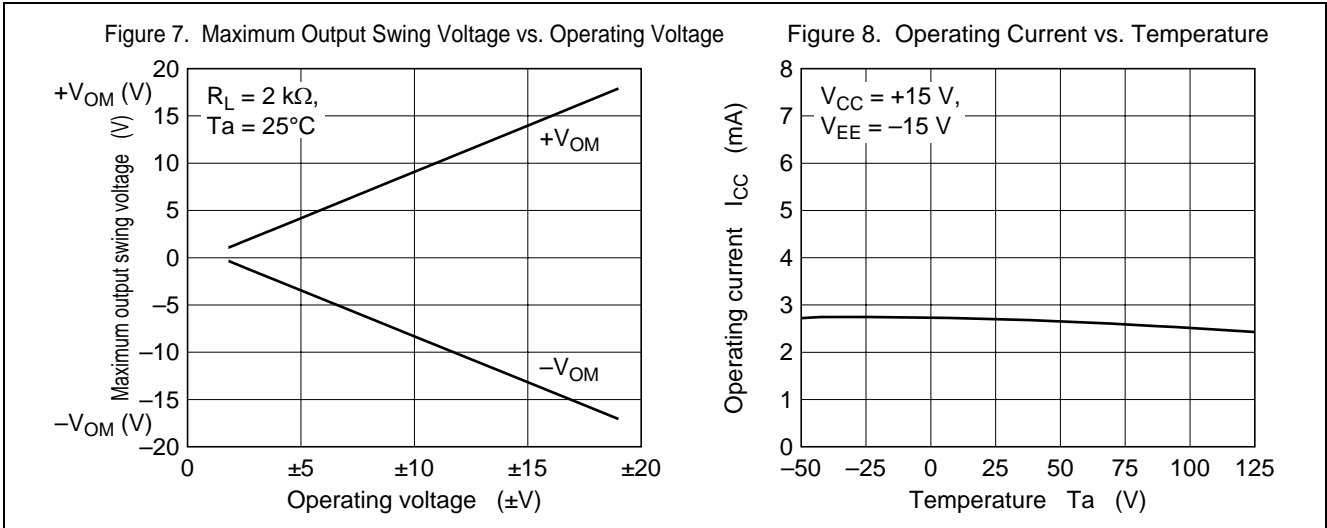
**Table of Graphs**

<b>Electrical Characteristics</b>		<b>Figure</b>
Open loop voltage gain	vs. Frequency $f$	1
Output swing voltage	vs. Frequency $f$	2
Output swing voltage	vs. Load resistance $R_L$	3
Equivalent input noise voltage	vs. Frequency $f$	4
Input offset voltage	vs. Temperature $T_a$	5
Total harmonic distortion	vs. Output Voltage $V_o$	6
Maximum output voltage swing	vs. Operating voltage $V$	7
Operating current	vs. Temperature $T_a$	8

### Typical Characteristics Curves



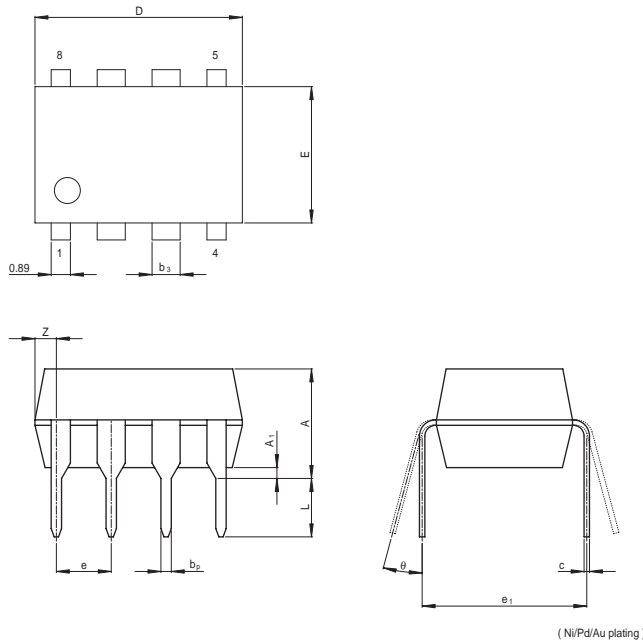
Typical Characteristics Curves (cont.)





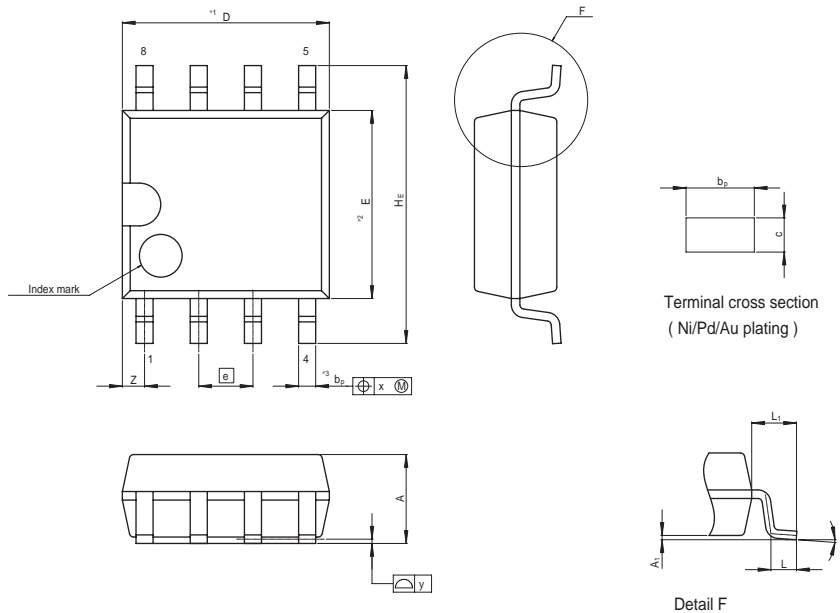
### Package Dimensions

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 <sub>1</sub>	—	7.62	—
D	—	9.60	10.6
E	—	6.30	7.4
A	—	—	5.06
A <sub>1</sub>	0.5	—	—
b <sub>p</sub>	0.40	0.48	0.56
b <sub>3</sub>	—	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

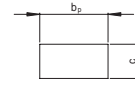
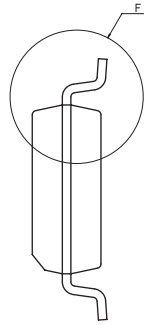
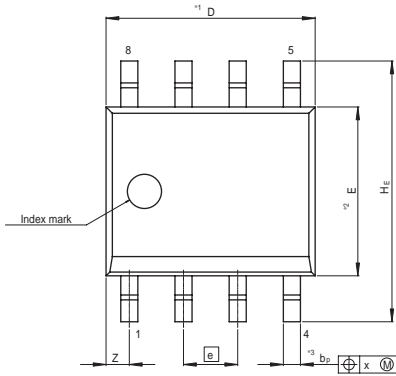


NOTE  
 1. DIMENSIONS\*\*1 (Nom)\*\*AND\*\*2\* DO NOT INCLUDE MOLD FLASH.  
 2. DIMENSION\*\*3\* DOES NOT INCLUDE TRIM OFFSET.

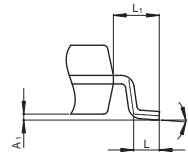
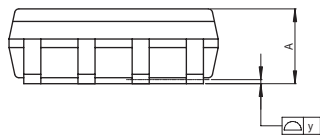
Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	—	4.85	5.25
E	—	4.4	—
A <sub>2</sub>	—	—	—
A <sub>1</sub>	0.00	0.1	0.20
A	—	—	2.03
b <sub>p</sub>	0.35	0.4	0.45
b <sub>1</sub>	—	—	—
c	0.15	0.20	0.25
c <sub>1</sub>	—	—	—
θ	0°	—	8°
H <sub>E</sub>	6.35	6.5	6.75
Ⓧ	—	1.27	—
x	—	—	0.12
y	—	—	0.15
Z	—	—	0.75
L	0.42	0.60	0.85
L <sub>1</sub>	—	1.05	—

# RNB4580 Series

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 <sub>2</sub>	—	—	—
A <sub>1</sub>	0.10	0.14	0.25
A	—	—	1.75
b <sub>p</sub>	0.34	0.40	0.46
b <sub>1</sub>	—	—	—
c	0.15	0.20	0.25
c <sub>1</sub>	—	—	—
$\theta$	0°	—	8°
H <sub>E</sub>	5.80	6.10	6.20
$\square$	—	1.27	—
x	—	—	0.25
y	—	—	0.10
Z	—	—	0.75
L	0.40	0.60	1.27
L <sub>1</sub>	—	1.08	—

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