HA17558 Series

Dual Operational Amplifier

HITACHI

Description

HA17558 is dual operational amplifiers which provides internal frequency compensation and high performance. It can be applied widely to measuring control equipment and to general Use. The two amplifiers share a common bias network and power supply leads.

Features

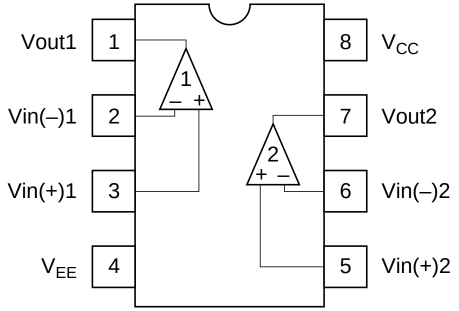
- High voltage Gain: 104dB (Typ)
- High speed: 1V/µs
- Continuous short-circuit protection
- Low-noise operational amplifiers
- Internal frequency compensation

Ordering Information

Type No.	Application	Package
HA17558FP	Industrial use	FP-8D
HA17558F	Commercial use	FP-8D
HA17558	Commercial use	DP-8
HA17558PS	Industrial use	DP-8

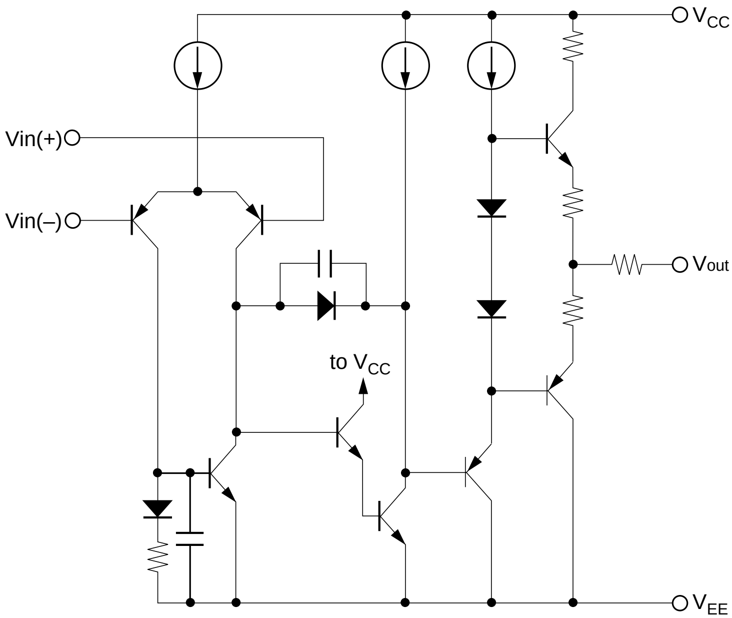
Hitachi semiconductor

Pin Arrangement



(Top View)

Circuit Schematic (1/2)



Absolute Maximum Ratings (Ta = 25°C)

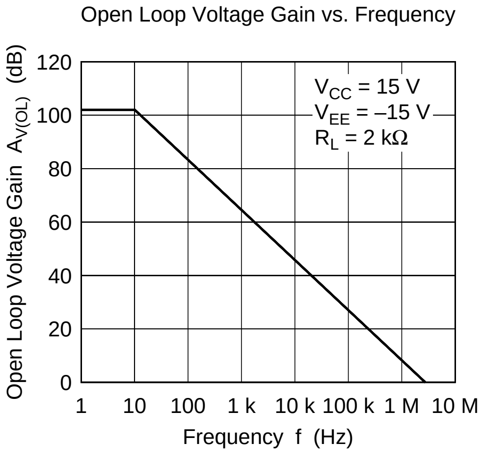
Item	Symbol	Ratings HA17558	HA17558 PS	HA17558 F	HA17558 FP	Unit
Supply voltage	V_{CC}	+18	+18	+18	+18	V
	V_{EE}	–18	–18	–18	–18	V
Differential input voltage	$V_{IN\ (diff)}$	±30	±30	±30	±30	V
Common-mode input voltage	V_{CM}*3	±15	±15	±15	±15	V
Power dissipation	P_T	670*1	670*1	385*2	385*2	mW
Operating temperature	Topr	–20 to +75	–20 to +75	–20 to +75	–20 to +75	–20 to +75
Storage temperature	Tstg	–55 to +125	–55 to +125	–55 to +125	–55 to +125	°C

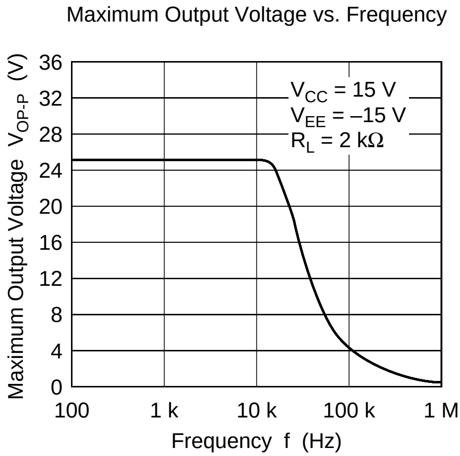
Notes: 1. These are the allowable values up to Ta = 45 °C. Derate by 8.3mW/°C above that temperature.
2. These are the allowable values up to Ta = 31 °C mounting on 30% wiring density glass epoxy board. Derate by 7.14mW/°C above that temperature.
3. If the supply voltage is less than ±15V, input voltage should be less than supply voltage.

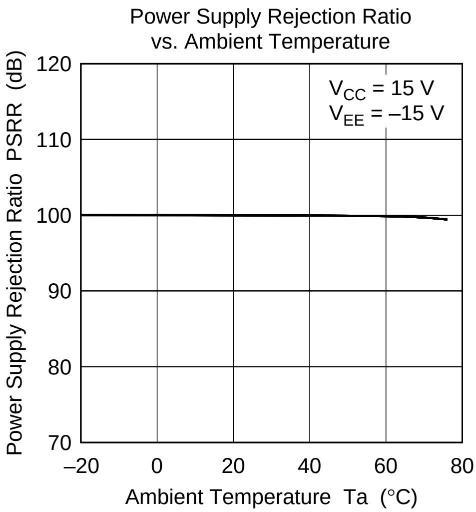
Electrical Characteristics (Ta = 25°C, V_{CC} = +15V, V_{EE} = –15V)

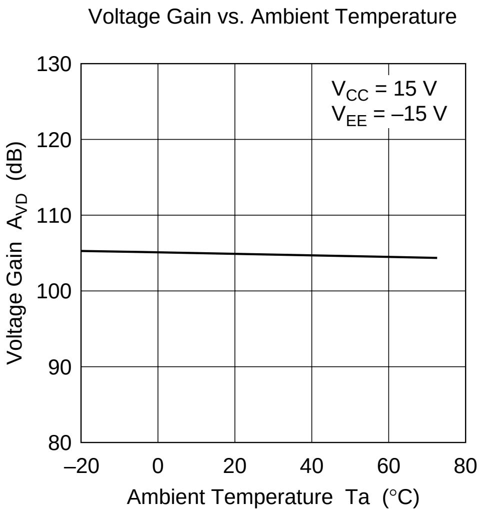
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Input offset voltage	V_{IO}	—	0.5	6	mV	$R_S \le 10k\Omega$
Input offset current	I_{IO}	—	5	200	nA	
Input bias current	I_{IB}	—	50	500	nA	
Voltage gain	A_{VD}	86	104	—	dB	$R_L \ge 2k\Omega$, $V_O = \pm 10V$
Maximum output voltage	Vop-p	±12	±14	—	V	$R_L \ge 10k\Omega$
Maximum output voltage	Vop-p	±10	±12.4	—	V	$R_L \ge 2k\Omega$
Common mode input voltage range	V_{CM}	±12	±14	—	V	
Common mode rejection ratio	CMR	70	100	—	dB	$R_S \le 10k\Omega$
Supply voltage rejection ratio	PSRR	—	10	150	µV/V	$R_S \le 10k\Omega$
Power dissipation	Pd	—	90	170	mW	2-channel, No load
Slew rate	SR	—	1.0	—	V/µs	$A_{VD} = 1$
Equivalent input noise voltage	V_{NI}	—	6	—	µVp-p	$R_S = 1k\Omega$, f = 1H_Z to 1kH_Z
Channel separation	CS	—	105	—	dB	f = 1kHz

Characteristic Curves

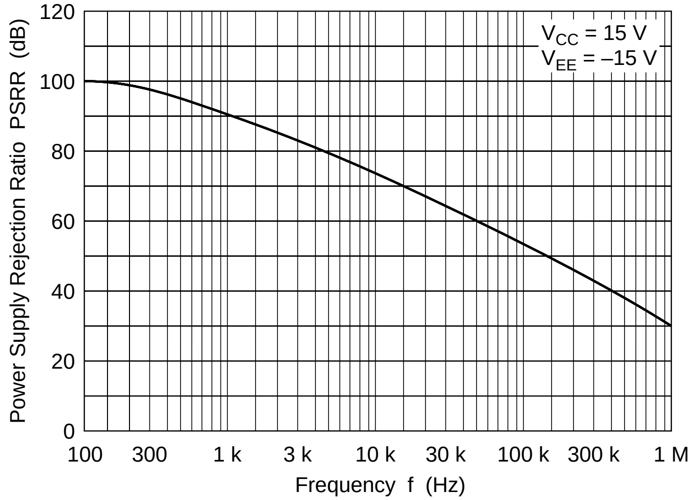




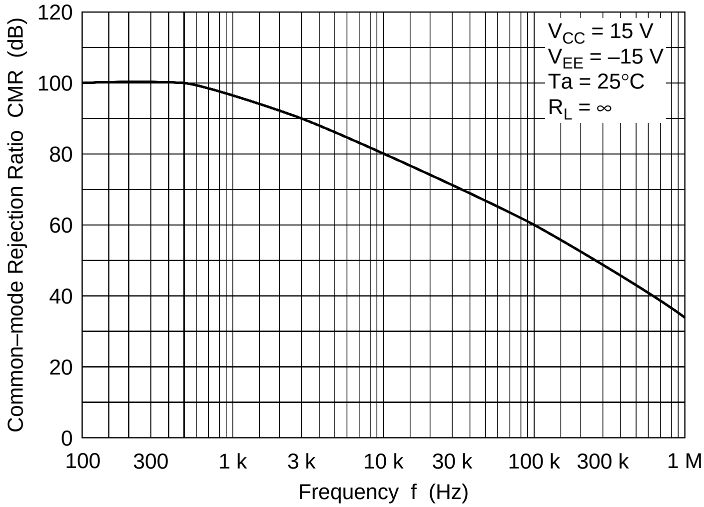




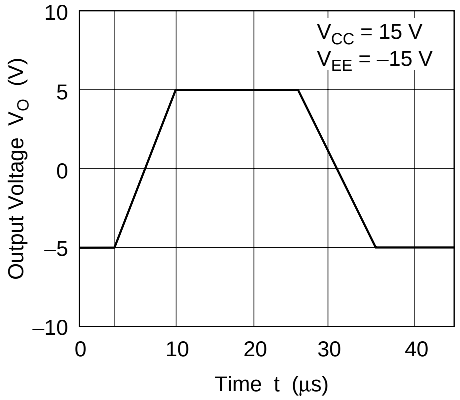
Power Supply Rejection Ratio vs. Frequency



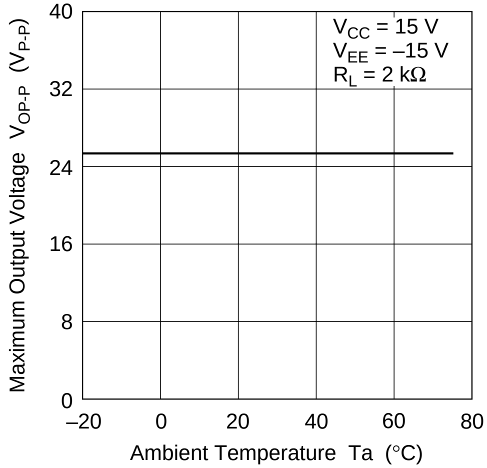
Common-mode Rejection Ratio vs. Frequency



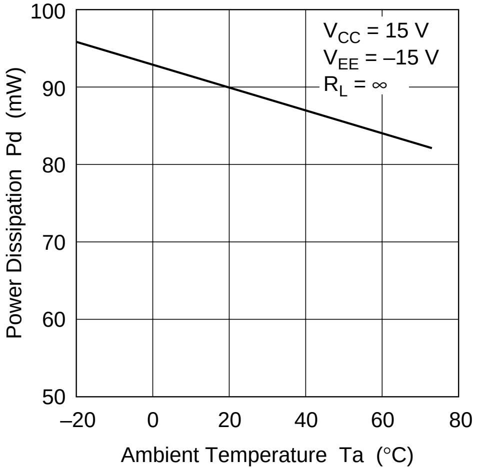
Transient Response



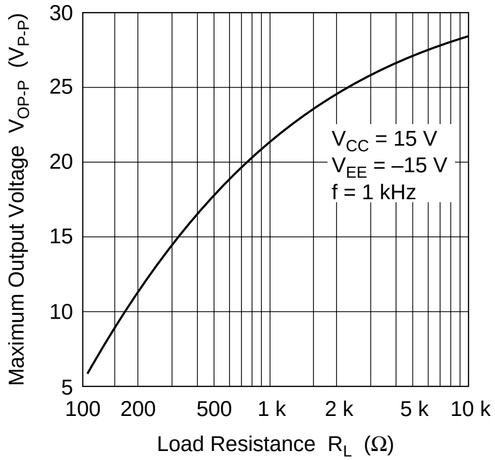
Maximum Output Voltage vs. Ambient Temperature

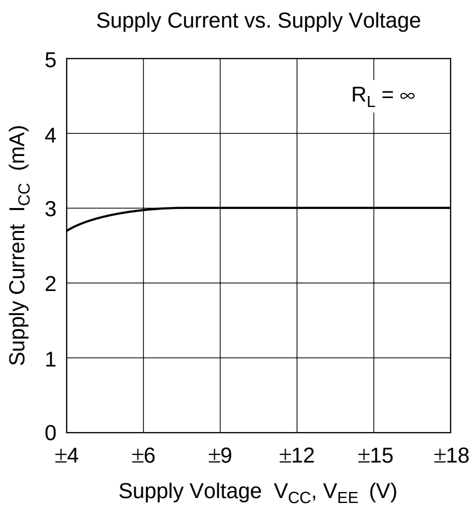


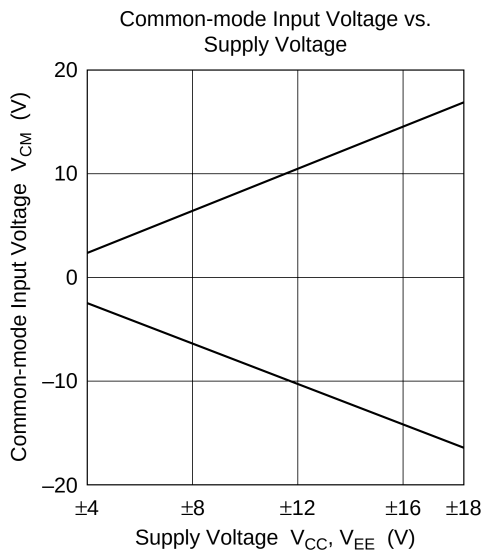
Power Dissipation vs. Ambient Temperature

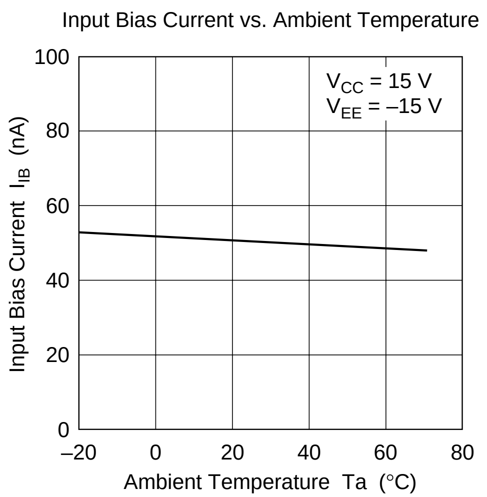


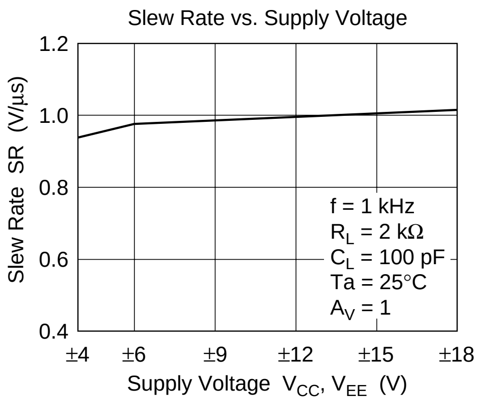
Maximum Output Voltage vs. Load Resistance

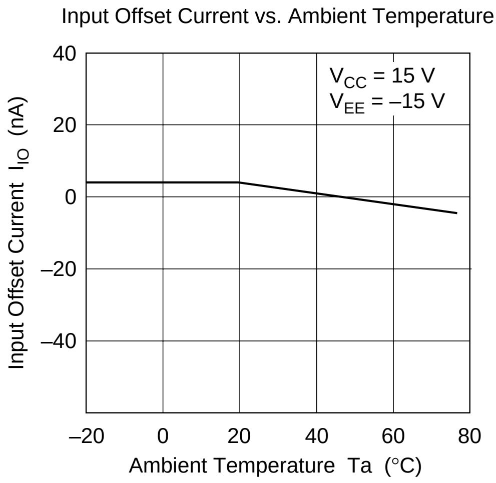


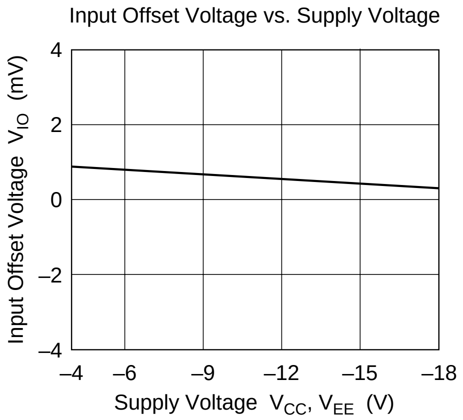

Supply Current vs. Supply Voltage
Supply Current ICC (mA)
5
4
3
2
1
0
RL = ∞
±4
±6
±9
±12
±15
±18
Supply Voltage VCC, VEE (V)

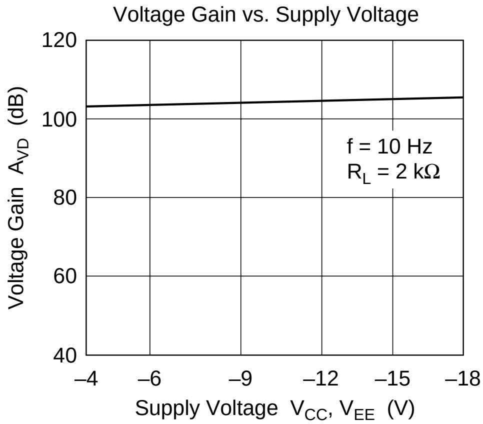

Common-mode Input Voltage vs. Supply Voltage
Common-mode Input Voltage VCM (V)
20
10
0
–10
–20
±4
±8
±12
±16
±18
Supply Voltage VCC, VEE (V)

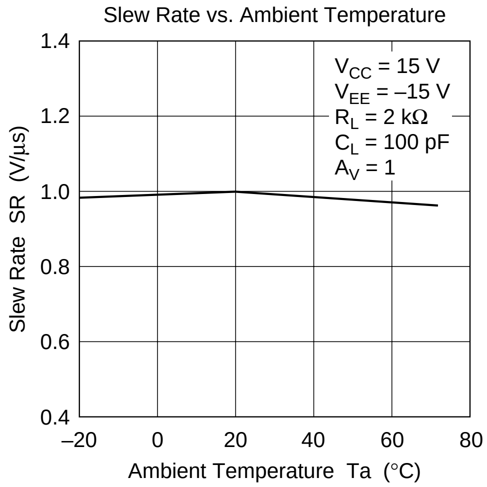

Input Bias Current vs. Ambient Temperature
Input Bias Current IIB (nA)
100
80
60
40
20
0
VCC = 15 V
VEE = –15 V
–20
0
20
40
60
80
Ambient Temperature Ta (°C)


Slew Rate vs. Supply Voltage
Slew Rate SR (V/µs)
1.2
1.0
0.8
0.6
0.4
f = 1 kHz
RL = 2 kΩ
CL = 100 pF
Ta = 25°C
AV = 1
±4
±6
±9
±12
±15
±18
Supply Voltage VCC, VEE (V)

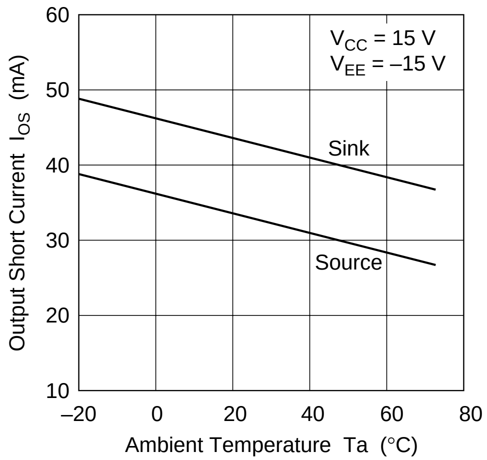

Input Offset Current vs. Ambient Temperature
V_{CC} = 15 V
V_{EE} = –15 V
Input Offset Current I_{IO} (nA)
40
20
0
–20
–40
–20
0
20
40
60
80
Ambient Temperature Ta (°C)


Input Offset Voltage vs. Supply Voltage
Input Offset Voltage V_{IO} (mV)
4
2
0
–2
–4
–4
–6
–9
–12
–15
–18
Supply Voltage V_{CC}, V_{EE} (V)

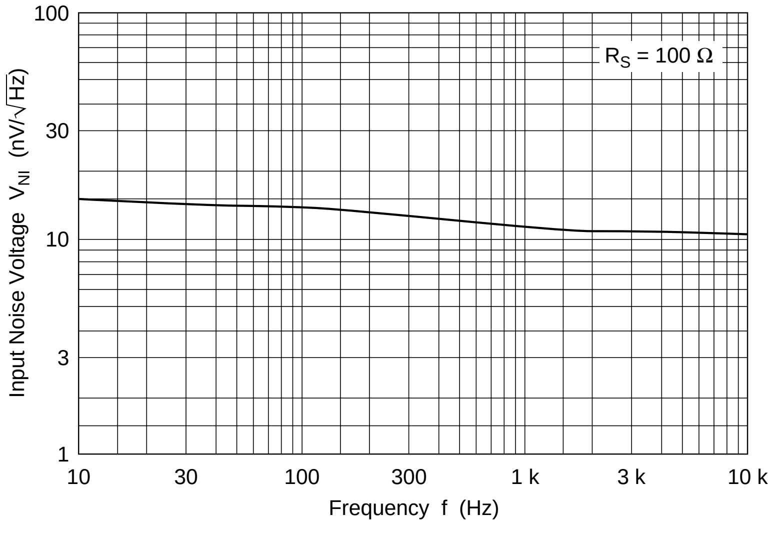

Voltage Gain vs. Supply Voltage
f = 10 Hz
R_L = 2 kΩ
Voltage Gain A_{VD} (dB)
120
100
80
60
40
–4
–6
–9
–12
–15
–18
Supply Voltage V_{CC}, V_{EE} (V)

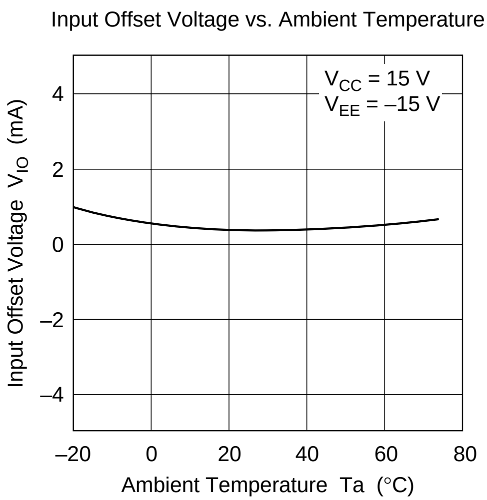

Slew Rate vs. Ambient Temperature
V_{CC} = 15 V
V_{EE} = –15 V
R_L = 2 kΩ
C_L = 100 pF
A_V = 1
Slew Rate SR (V/µs)
1.4
1.2
1.0
0.8
0.6
0.4
–20
0
20
40
60
80
Ambient Temperature Ta (°C)

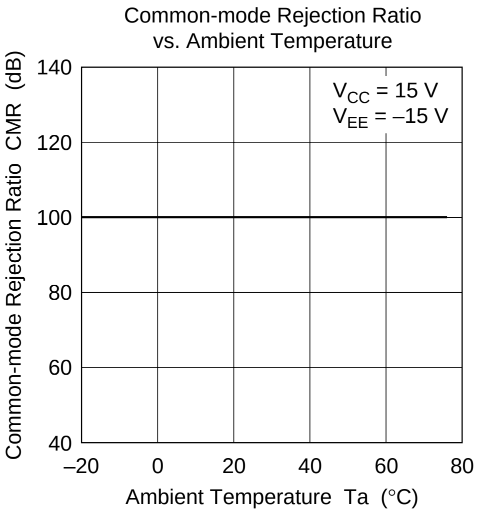
Output Short Current vs. Ambient Temperature



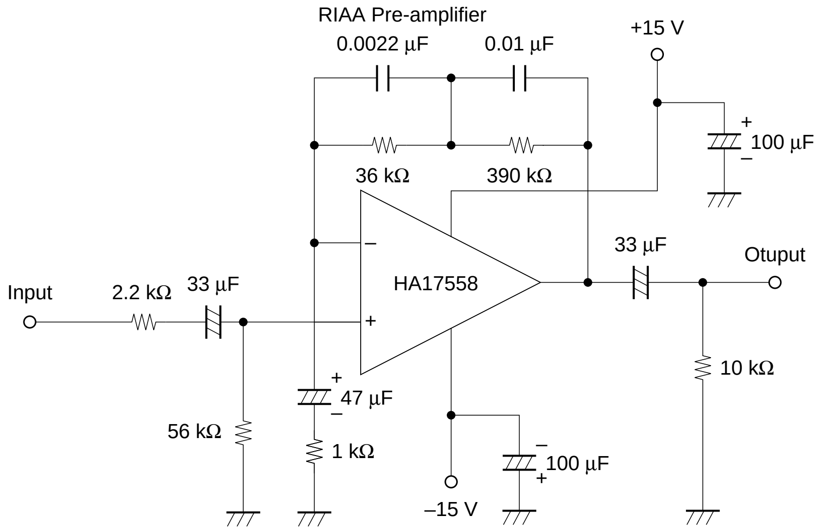
Input Noise Voltage vs. Frequency



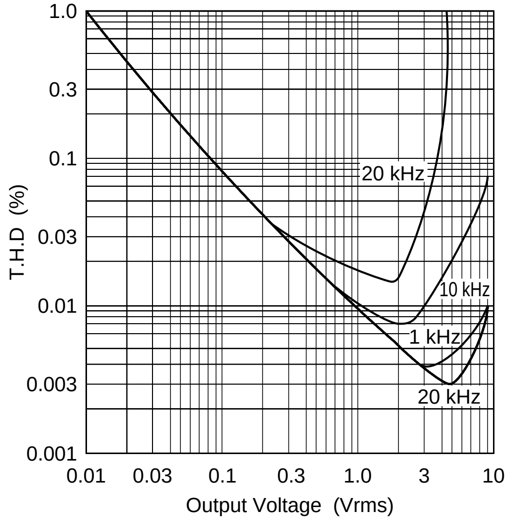

Input Offset Voltage vs. Ambient Temperature
Input Offset Voltage V_{IO} (mA)
V_{CC} = 15 V
V_{EE} = –15 V
4
2
0
–2
–4
–20
0
20
40
60
80
Ambient Temperature Ta (°C)


Common-mode Rejection Ratio
vs. Ambient Temperature
Common-mode Rejection Ratio CMR (dB)
V_{CC} = 15 V
V_{EE} = –15 V
140
120
100
80
60
40
–20
0
20
40
60
80
Ambient Temperature Ta (°C)

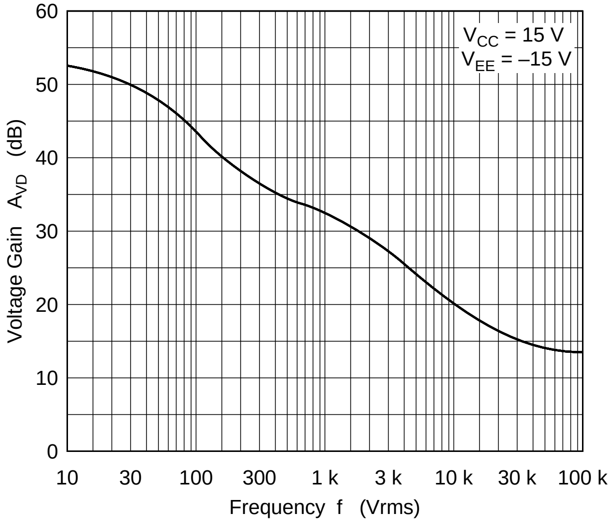
Circuit Example



T.H.D. vs. Output Voltage (RIAA Pre-Amp)

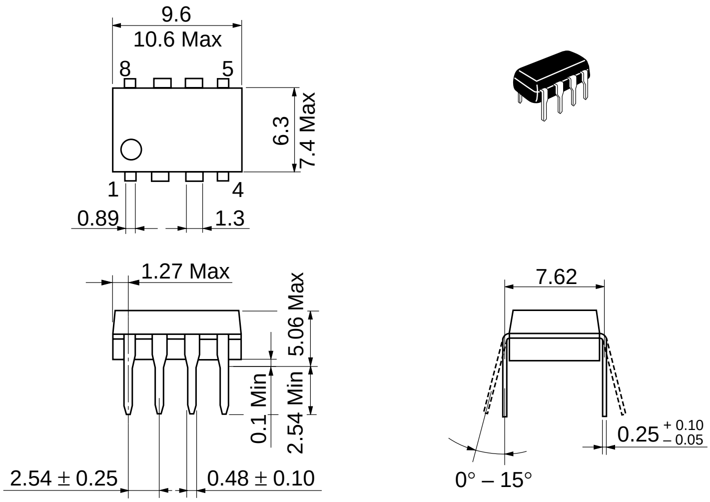


T.H.D. vs. Output Voltage (RIAA Pre–Amp)



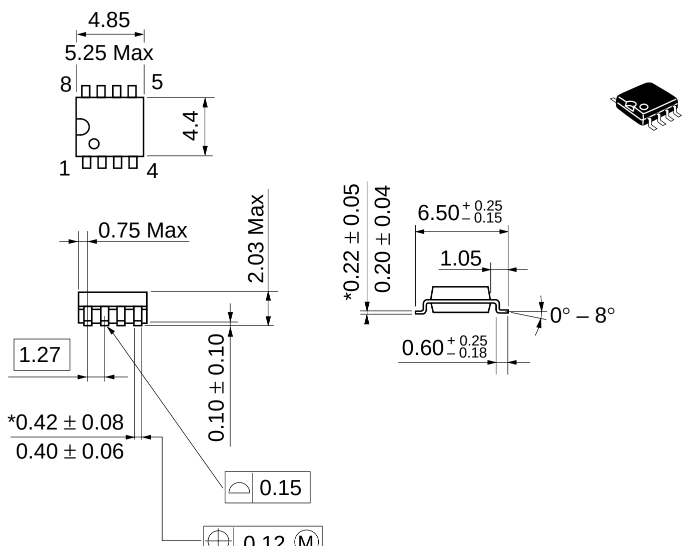
Package Dimensions

Unit: mm



Hitachi Code	DP-8
JEDEC	Conforms
EIAJ	Conforms
Mass (reference value)	0.54 g

Unit: mm



Hitachi Code	FP-8D
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.10 g

*Dimension including the plating thickness
Base material dimension

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