

AN1458 (AN6572), AN1458S, AN6571

Dual Operational Amplifiers

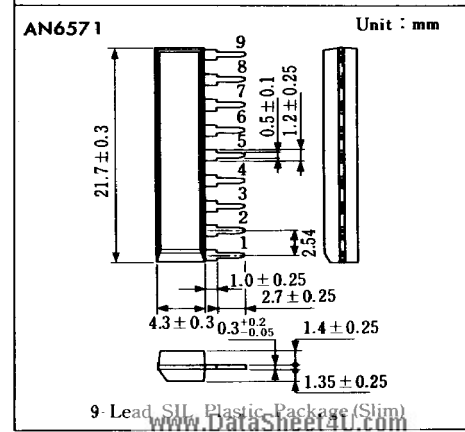
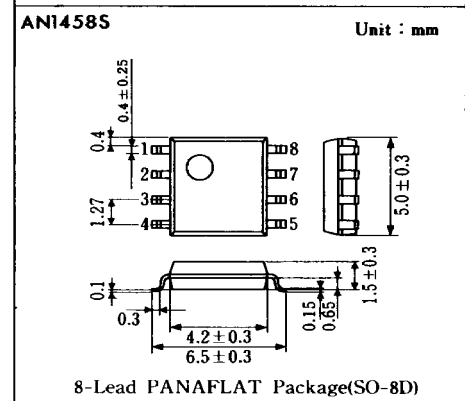
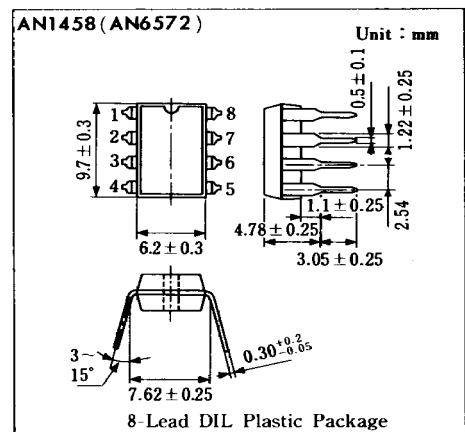
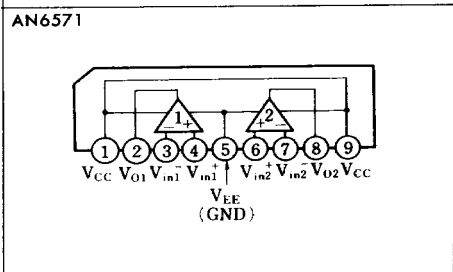
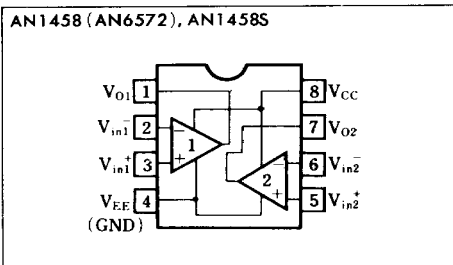
Outline

The AN1458 (AN6572), the AN1458S, and the AN6571 are dual operational amplifiers with phase compensation circuits built-in and also an output short-circuit protection built-in, so that they are highly stable and can be used widely in various electronic circuits.

Features

- Built-in phase compensation circuit
- Wide range of common-mode input voltage, no latch-up
- Built-in short-circuit protection
- Low input offset voltage : $V_{I(offset)} = 0.5mV$ typ.
- Low input offset current : $I_{I0} = 10nA$ typ.

Block Diagrams



■ Pin

<AN1458 (AN6572), AN1458S>

Pin No.	Pin Name
1	Ch. 1 Output
2	Ch. 1 Invert Input
3	Ch. 1 Non Invert Input
4	V _{EE} (GND)
5	Ch. 2 Non Invert Input
6	Ch. 2 Invert Input
7	Ch. 2 Output
8	V _{CC}

<AN6571>

Pin No.	Pin Name
1	V _{CC}
2	Ch. 1 Output
3	Ch. 1 Invert Input
4	Ch. 1 Non Invert Input
5	V _{EE} (GND)
6	Ch. 2 Non Invert Input
7	Ch. 2 Invert Input
8	Ch. 2 Output
9	V _{CC}

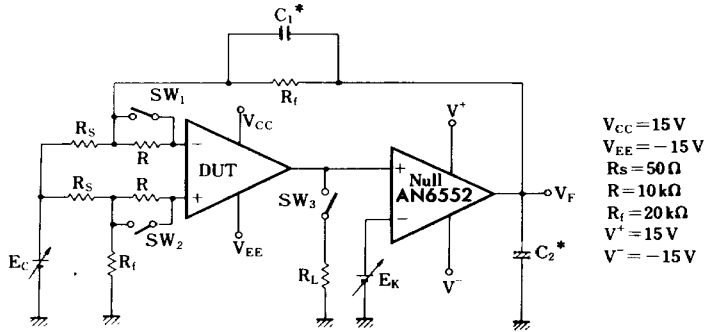
■ Absolute Maximum Ratings (Ta = 25°C)

Item		Symbol	Rating	Unit
Voltage	Supply Voltage	V _{CC}	±18	V
	Differential Input Voltage	V _{ID}	±30	V
	Common-Mode Input Voltage	V _{ICM}	±15	V
Power Dissipation	AN1458 (AN6572), AN6571	P _D	500	mW
	AN1458S		360	
Operating Ambient Temperature		T _{opr}	-20 ~ +75	°C
Storage Temperature	AN1458 (AN6572), AN6571	T _{stg}	-55 ~ +150	°C
	AN1458S		-55 ~ +125	

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

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Input Offset Voltage	V _{I(offset)}	1	R _S ≤ 10kΩ		0.5	4	mV
Input Offset Current	I _{IO}	1			10	100	nA
Input Bias Current	I _{Bias}	1			50	250	nA
Voltage Gain	G _V	1	R _L ≥ 2kΩ, V _O = ±10V	86	106		dB
		2	R _L ≥ 10kΩ	±12	±14		V
Maximum Output Voltage	V _{O(max.)}	2	R _L ≥ 2kΩ	±10	±13		V
		3		±12	±13		V
Common-Mode Input Voltage Width	V _{CM}	3		70	90		dB
Common-Mode Rejection Ratio	CMR	1	R _S ≤ 10kΩ		3	150	μV/V
Supply Voltage Rejection Ratio	SVR	1	R _S ≤ 2kΩ				mA
Supply Current	I _{CC}	4	R _L = ∞			5.6	mW
Power Consumption	P _C	4	R _L = ∞			170	mA
Output Short-Circuit Current	I _{O(short)}	2			±20		μs
Slew Rate	SR	5					

Test Circuit 1 ($V_{I(offset)}$, I_{I0} , I_{Bias} , G_V , CMR , SVR)



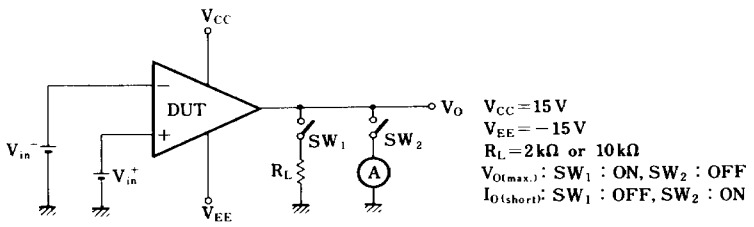
$V_{CC} = 15V$
 $V_{EE} = -15V$
 $R_S = 50\Omega$
 $R = 10k\Omega$
 $R_f = 20k\Omega$
 $V^+ = 15V$
 $V^- = -15V$

* C_1 and C_2 are capacitors for the prevention of oscillation.

Item	Measurement Conditions
Input Offset Voltage	V_{F1} is measured with the SW_1 , SW_2 and SW_3 set to OFF and $E_C = E_K = 0V$. Can be given by $V_{I(offset)} = \frac{V_{F1}}{400} (V)$
Input Offset Current	V_{F2} is measured with the SW_1 and SW_2 set to ON, the SW_3 set to OFF and $E_C = E_K = 0V$. Can be given by $I_{I0} = \frac{ V_{F2} - V_{F1} }{4 \times 10^6} (A)$
Input Bias Current	V_{F3} is measured with the SW_3 set to OFF, $E_C = E_K = 0V$, the SW_1 set to ON and the SW_2 set to OFF. V_{F4} is measured with the SW_1 and SW_2 reversed. Can be given by $I_{Bias} = \frac{ V_{F3} - V_{F4} }{8 \times 10^6} (A)$
Voltage Gain	V_{F5} is measured with the SW_1 , SW_2 and SW_3 set to ON, $E_C = 0V$ and $E_K = 10V$. V_{F5} is measured with $E_K = -10V$. Can be given by $G_V = 20 \log \left(\frac{8000}{ V_{F5} - V_{F5}' } \right)$
Common-Mode Rejection Ratio	V_{F6} is measured with both the SW_1 and SW_2 set to ON, the SW_3 set to OFF, $E_K = 0V$ and $E_C = 5V$. V_{F6}' is measured with $E_C = -5V$. Can be given by $CMR = 20 \log \left(\frac{4000}{ V_{F6} - V_{F6}' } \right)$
Supply Voltage Rejection Ratio I	V_{F7} is measured with both the SW_1 and SW_2 set to ON, the SW_3 set to OFF, $E_K = E_C = 0V$ and $V_{CC} = 10V$. Can be given by $SVR(+)= \frac{ V_{F7} - V_{F2} }{2 \times 10^3}$
Supply Voltage Rejection Ratio II	V_{F8} is measured with both the SW_1 and SW_2 set to ON, the SW_3 set to OFF, $E_K = E_C = 0V$ and $V_{EE} = -10V$. Can be given by $SVR(-)= \frac{ V_{F8} - V_{F2} }{2 \times 10^3}$

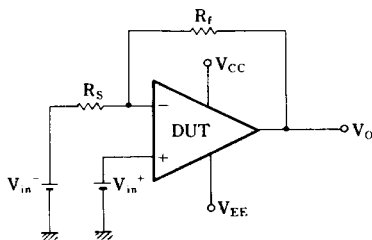
Note) When not specified in the above table, $V_{CC} = 15V$ and $V_{EE} = -15V$.

Test Circuit 2 ($V_{O(max)}$, $I_{O(short)}$)



$V_{CC} = 15V$
 $V_{EE} = -15V$
 $R_L = 2k\Omega$ or $10k\Omega$
 $V_{O(max)}$: SW_1 : ON, SW_2 : OFF
 $I_{O(short)}$: SW_1 : OFF, SW_2 : ON

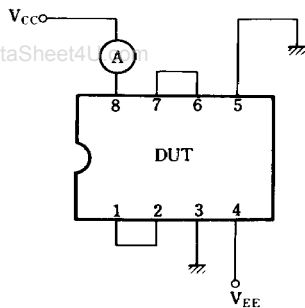
Test Circuit 3 (V_{CM})



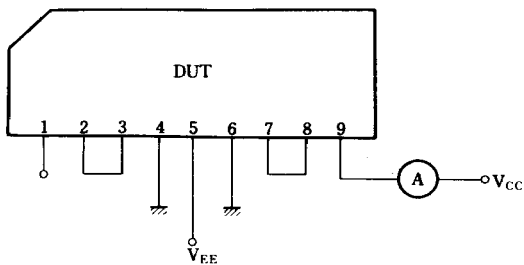
$V_{CC} = 15V$
 $V_{EE} = -15V$
 $R_S = 200\Omega$
 $R_f = 2k\Omega$

Note) Apply a voltage of $|v_{in+}| > 12V$ and check $V_O = V_{in+} + \frac{R_f}{R_S}(V_{in+} - V_{in-})$

Test Circuit 4 (I_{CC} , P_C)

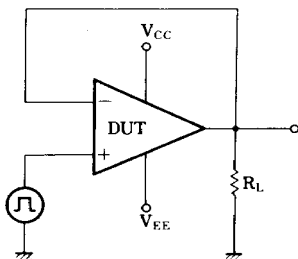


(AN1458 (AN6572)
 AN1458S)

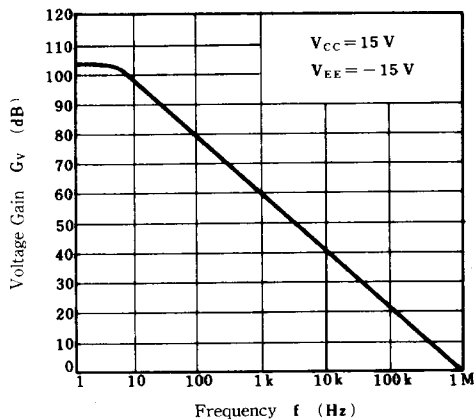


(AN6571)

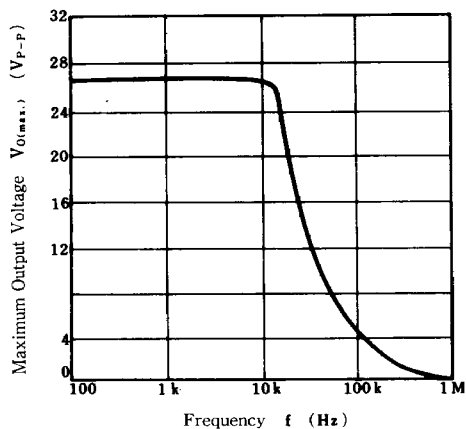
Test Circuit 5 (SR)



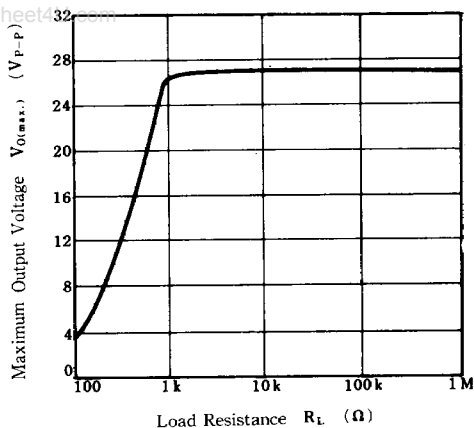
$G_V - f$



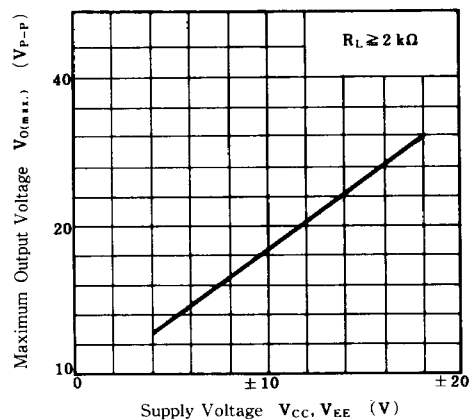
$V_{O(max.)} - f$



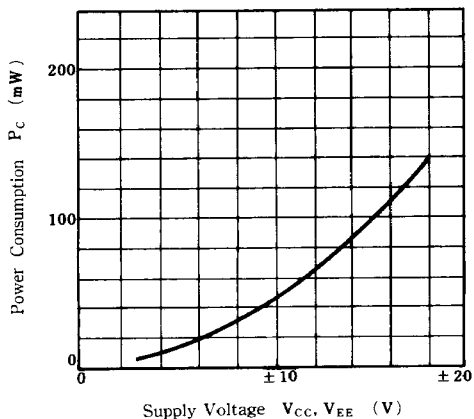
$V_{O(max.)} - R_L$



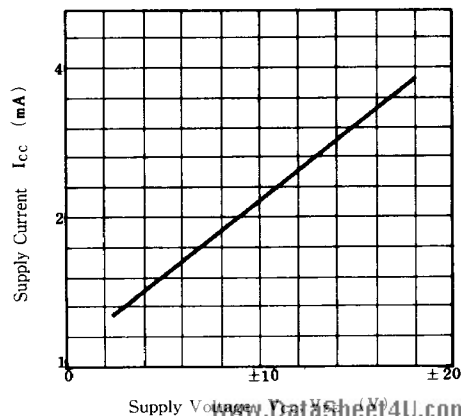
$V_{O(max.)} - V_{CC}, V_{EE}$



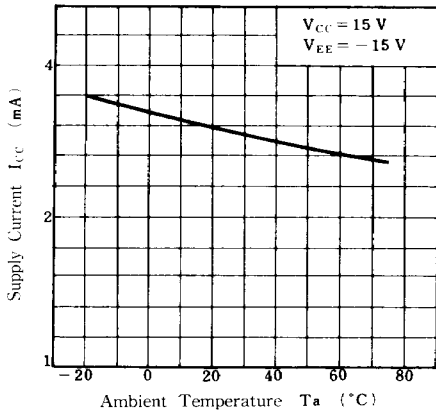
$P_C - V_{CC}, V_{EE}$



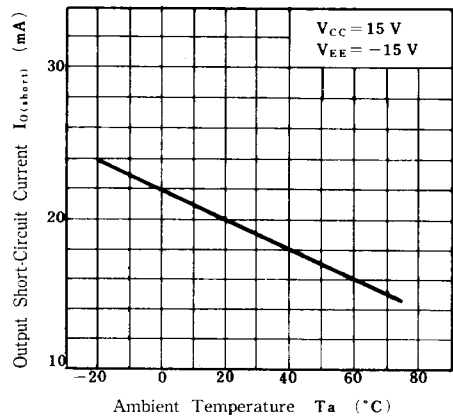
$I_{CC} - V_{CC}, V_{EE}$



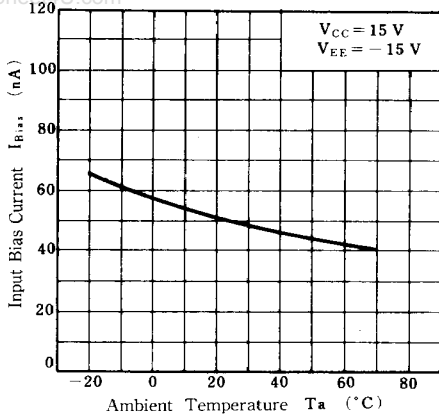
$I_{CC} - T_a$



$I_{O(short)} - T_a$



$I_{Bias} - T_a$



■ Application Circuit

Differential Amplifier Circuit

