AN4250, AN4250S, AN6593

Single Low Power Operational Amplifiers

■ Outline

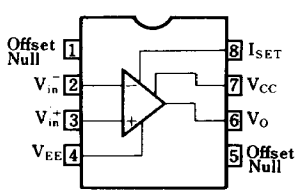
The AN4250, the AN4250S, and the AN6593 are single operational amplifiers which can be operated with very low power consumption. Moreover, they have wide range (±1V ~ ±18V) of supply voltage, and electrical characteristics such as power consumption and input bias current can be programmed according to the current value set by outer resistance. They are suited for application to various electronic circuits such as portable electronic equipment operated by the battery.

■ Features

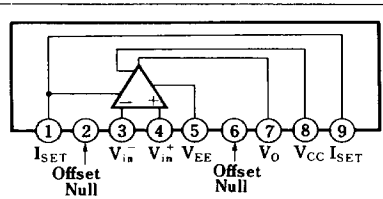
- Wide supply voltage range (±1V ~ ±18)
- Electrical characteristics programmable by set current
- Phase compensation circuit
- Output short-circuit protection
- Offset null

■ Block Diagrams

AN4250, AN4250S

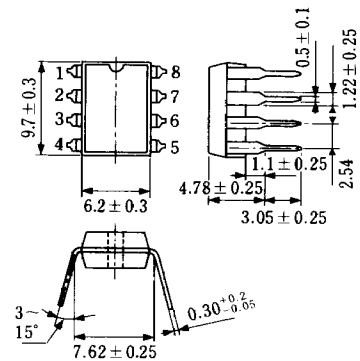


AN6593



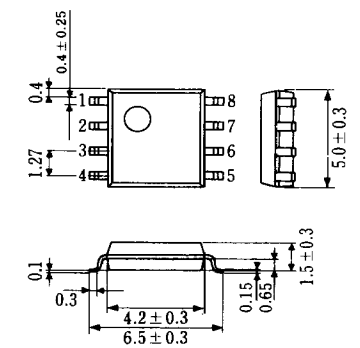
Note) Pin ① and Pin ⑨ are common.

AN4250 Unit : mm



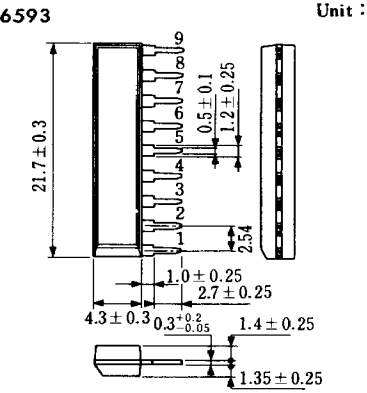
8-Lead DIL Plastic Package

AN4250S Unit : mm



8-Lead PANAFLAT Package(SO-8D)

AN6593 Unit : mm



9-Lead SIL Plastic Package (Slim)

■ Pin

〈AN4250, AN4250S〉

Pin No.	Pin Name
1	Offset Null
2	Invert Input
3	Non Invert Input
4	V_{EE} (GND)
5	Offset Null
6	Output
7	V_{CC}
8	I_{SET}

〈AN6593〉

Pin No.	Pin Name
1	I_{SET}
2	Offset Null
3	Invert Input
4	Non Invert Input
5	V_{EE} (GND)
6	Offset Null
7	Output
8	V_{CC}
9	I_{SET}

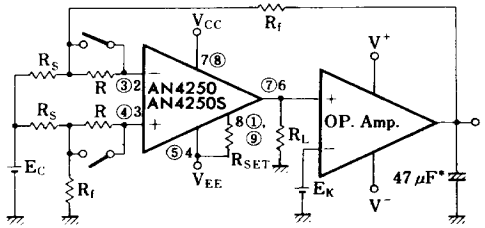
■ Absolute Maximum Ratings (Ta=25℃)

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	AN4250, AN6593	P_D	500	mW
	AN4250S		360	
Operating Ambient Temperature		T_{opr}	−20～+75	℃
Storage Temperature	AN4250, AN6593	T_{stg}	−50～+150	℃
	AN4250S		−50～+125	

■ Electrical Characteristics (V_{CC}=15V, V_{EE}=−15V, Ta=25℃)

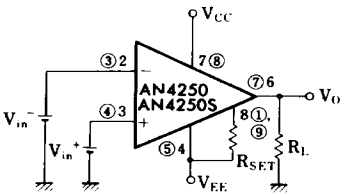
Item	Symbol	Test Circuit	Condition	I_{SET}=1μA		I_{SET}=10μA		Unit
				min.	max.	min.	max.	
Input Offset Voltage	$V_{IO(offset)}$	1	R_S≦100kΩ		5		6	mV
			$V^{\pm}$=±1.5V, R_S≦100kΩ		5		6	
Input Offset Current	I_{IO}	1			6		20	nA
Input Bias Current	I_{Bias}	1			10		75	nA
			$V^{\pm}$=±1.5V		10		75	
Large Signal Voltage Gain	G_V	1	V_O=±10V, R_L=100kΩ	96				dB
			V_O=±10V, R_L=10kΩ			96		
Supply Current	I_{CC}	4			11		100	μA
			$V^{\pm}$=±1.5V		8		90	
Power Consumption	P_C	4			330		3000	μW
			$V^{\pm}$=±1.5V		24		270	
Input Voltage Range	V_{CM}	3		±13.5		±13.5		V
			$V^{\pm}$=±1.5V	±0.6		±0.6		
Maximum Output Voltage	$V_{O(max.)}$	2	R_L=100kΩ	±12				V
			$V^{\pm}$=±1.5V, R_L=100kΩ	±0.6				
Maximum Output Voltage	$V_{O(max.)}$	2	R_L=10kΩ			±12		V
			$V^{\pm}$=±1.5V, R_L=10kΩ			±0.6		
Common-Mode Rejection Ratio	CMR	1	R_S≦10kΩ	70		70		dB
Supply Voltage Rejection Ratio	SVR	1	R_S≦10kΩ	74		74		dB

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

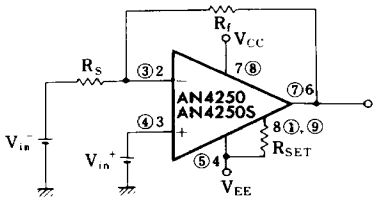


• Bipolar should be used.

Test Circuit 2 ($V_{O(max.)}$)

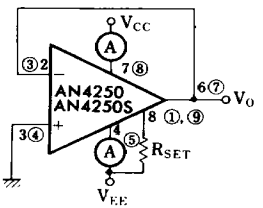


Test Circuit 3 (V_{CM})

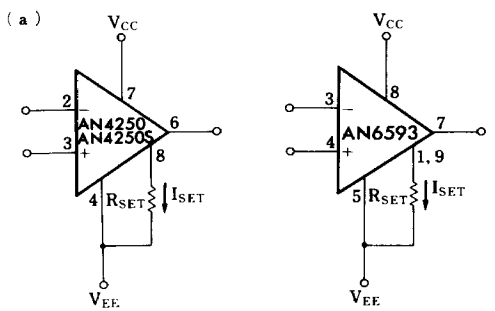


Note) The pin No. in ○ are for AN6593

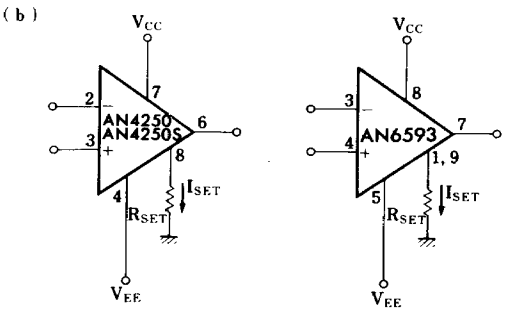
Test Circuit 4 (I_{CC}, P_C)



■ Normal Connection

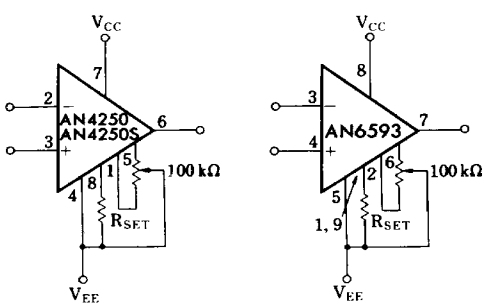


$$I_{SET} \simeq \frac{V_{CC} + |V_{EE}| - 0.5}{R_{SET}} \quad (I)$$

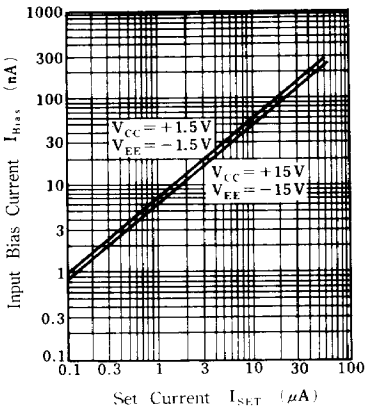


$$\cdot I_{SET} \simeq \frac{V_{CC} - 0.5}{R_{SET}} \quad (I)$$

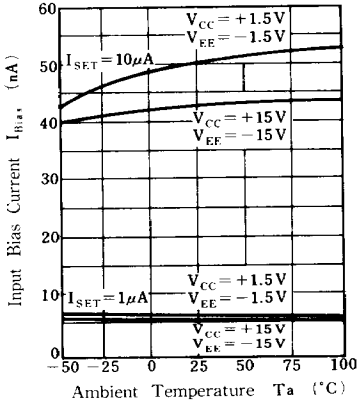
■ Offset Control



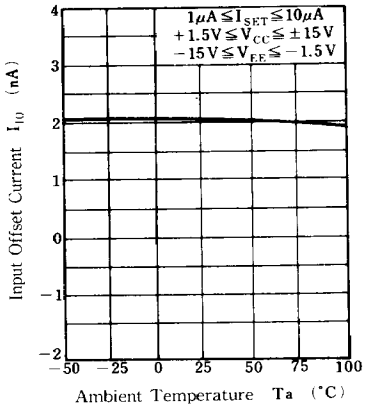
$I_{Bias} - I_{SET}$



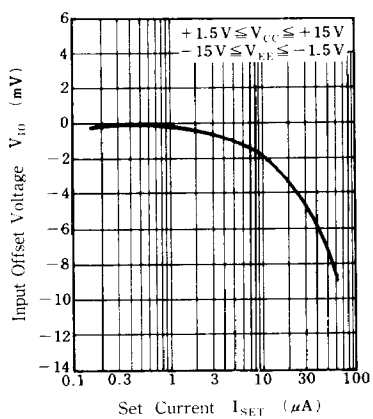
$I_{Bias} - Ta$



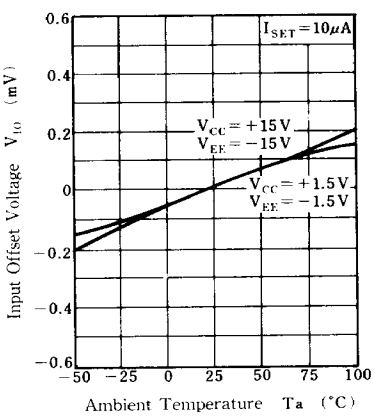
$I_{IO} - Ta$



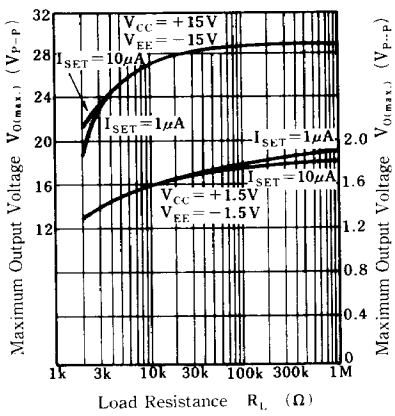
$V_{IO} - I_{SET}$



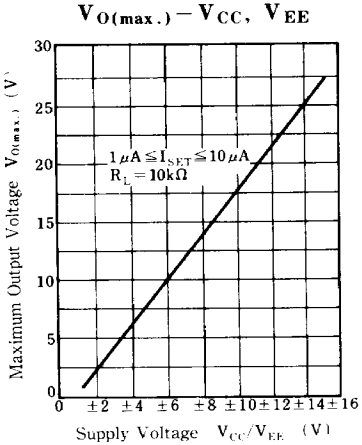
$V_{IO} - Ta$



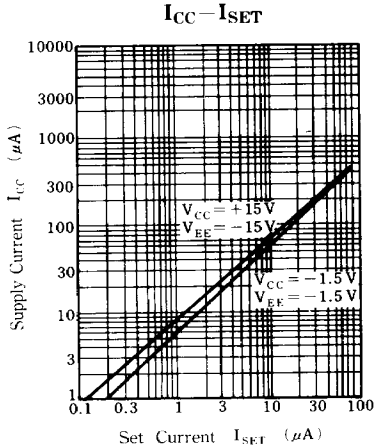
$V_{O(max.)} - R_L$



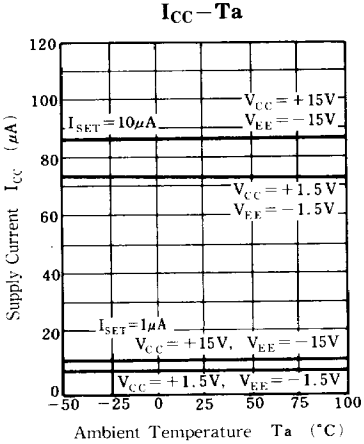
$V_{O(max.)} - V_{CC}$, V_{EE}



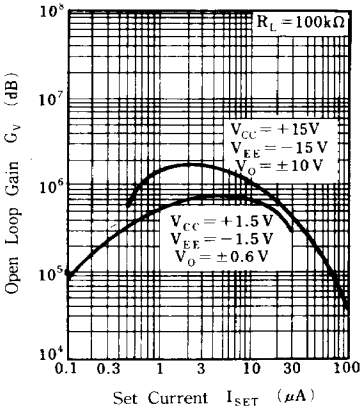
$I_{CC} - I_{SET}$



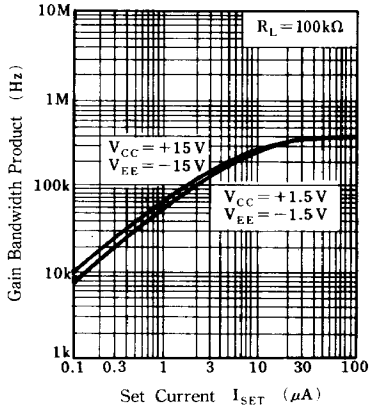
$I_{CC} - Ta$



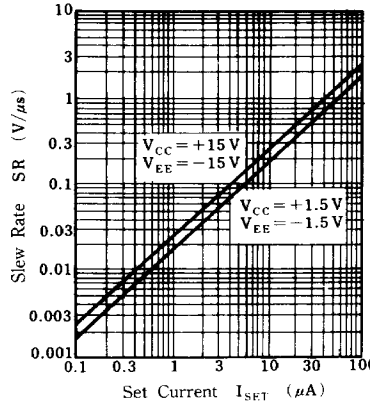
$G_V - I_{SET}$



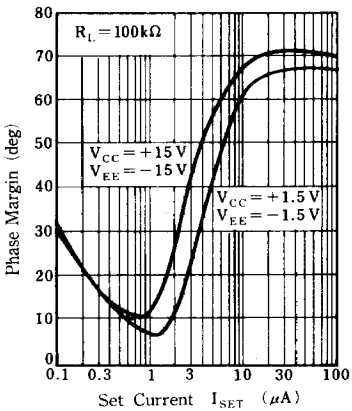
G·B Product—I_{SET}



SR—I_{SET}



Phase Margin—I_{SET}



$R_{SET} - I_{SET}$