Micropower Programmable Operational Amplifier

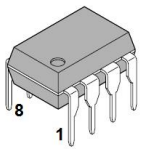
FEATURES

- ±1.2 V to ±18 V Operation
- Wide Programming Range
- Offset Null Capability
- No Frequency Compensation Required
- Low Input Bias Currents
- Short Circuit Protection

K140YD1201

K140YD12T

K140YD12P



General Description

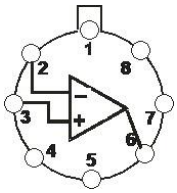
This extremely versatile operational amplifier of type K140YD12 features low power consumption and high input impedance. In addition, the quiescent currents within the device may be programmed by the choice of an external resistor value or current source applied to the I_{SET} input. This allows the amplifier's characteristics to be optimized for input current and power consumption despite wide variations in operating power supply voltages.

K140YD1201 is released in TO5-8, K140YD12P in PDIP-8(300Mil), K140YD12T in SOIC-8(150Mil).

Maximum Ratings

Parameter, unit	Symbol	Maximum Permissible		Limit	
		Min	Max	Min	Max
Power Supply Voltages, V	U_{CC}, U_{EE}	±3	±16,5	±1,5	±18
Common Mode Input Voltage, V (at Ucc≤±15 V, $±U_{IC}$≤Uccmin)	U_{IC}		±10		±15
Load resistance, KΩ	R_L	5		4,5	
Programming current , μA	I_{SET}		180		200

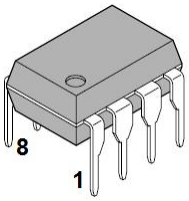
TO5-8
8-lead metal can package



Top view

SOIC-8 (150 Mil)

PDIP-8 (300 Mil)



Pin Information

Pins number Package type TO-5, SOIC-8, PDIP-8	Symbol	Description
1	**BAL1**	Offset Null
2	**-IN**	Invert input
3	**+IN**	Noninvert input
4	**V_{EE}**	Negative supply voltage
5	**BAL2**	Offset Null
6	**OUT**	Output
7	**V_{CC}**	Positive supply voltage
8	**I_{SET}**	Programming current

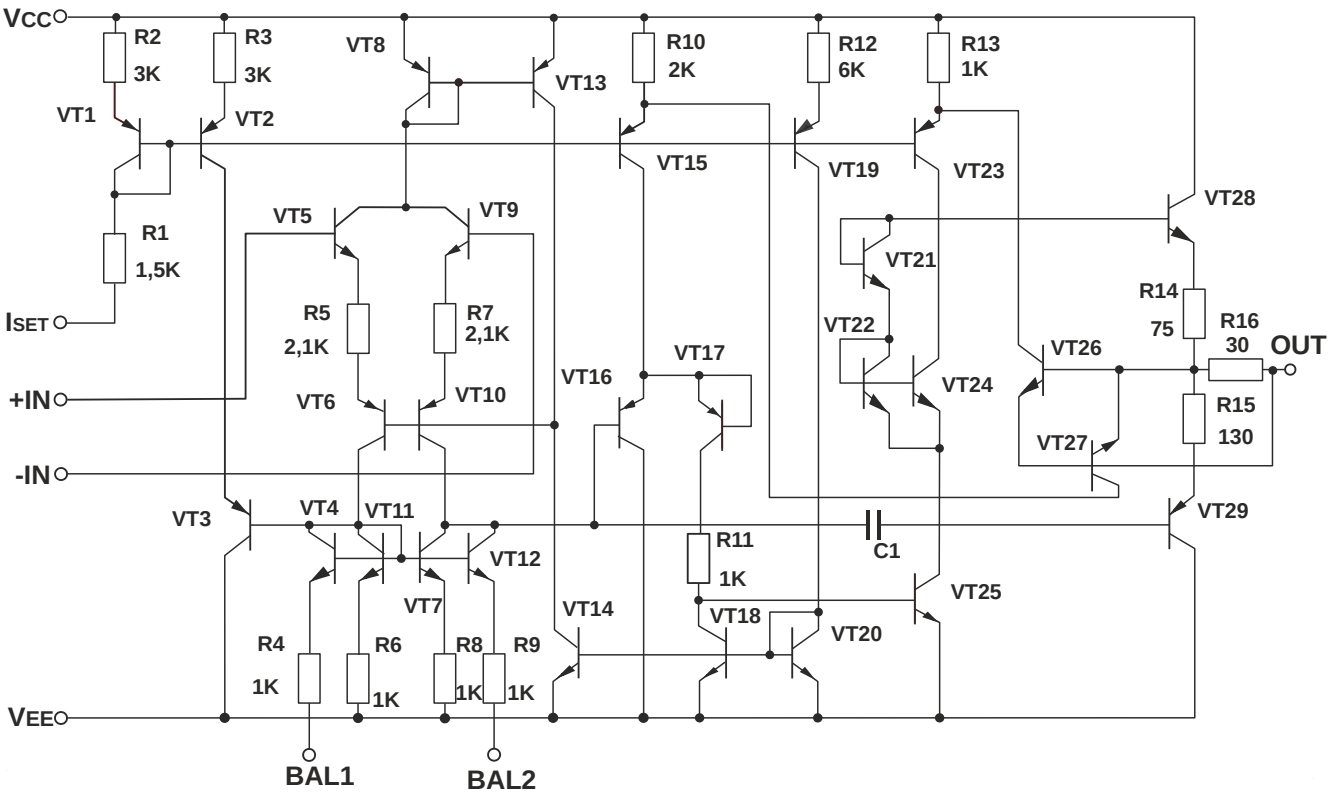
ELECTRICAL CHARACTERISTICS

Parameter, unit	Symbol	Norm		Measuring mode		
		Min	Max	$U_{CC,EE}$ V	I_{SET}, μA	R_L KΩ
1	2	3	4	5	6	7
1. Maximum output voltage , V	U_{Omax}	12	-12	±15	1,5	75
		12	-12	±15		
		13	-13	±16,5		
		1,9	-1,9	±3	15	5
		10	-10	±15		
		12	-12	±16,5		
2. Input Offset Voltage, mV	U_{IO}	-5	5	±3	1,5	75
				±15		
				±16,5		
				±3	15	5
				±15		
				±16,5		
3. Supply Current, μA	I_{CC}		20	±3	1,5	75
			25	±15		
			30	±16,5		
			160	±3	15	75
			180	±15		
			200	±16,5		
4. Input Bias Current, nA	I_I		7,5	±3	1,5	75
			7,5	±15		
			7,5	±16,5		
			50	±3	15	5
			50	±15		
			50	±16,5		
5. Input Offset Current, nA	I_{IO}	-3	3	±3	1,5	75
		-3	3	±15		
		-3	3	±16,5		
		-15	15	±3	15	5
		-15	15	±15		
		-15	15	±16,5		
6. Large Signal Voltage Gain	A_U	50000		±3	1,5	75
		100000		±15		
		100000		±16,5		
		50000		±3	15	5
		100000		±15		
		100000		±16,5		
7. Maximum Common Mode Input Voltage, V	U_{ICMAX}	1	-1	±3	1,5	75
		10	-10	±15		
		10	-10	±16,5		
		1	-1	±3	15	5
		10	-10	±15		
		10	-10	±16,5		
8. Common Mode Rejection, dB	K_{CMR}	70		±3	1,5	75
				±15		
				±16,5		
				±3	15	5
				±15		
				±16,5		
9. Supply Voltage Rejection Ratio, μV/V	K_{SVR}		150	±3	1,5	75
				±15		
				±16,5		
				±3	15	5
				±15		
				±16,5		

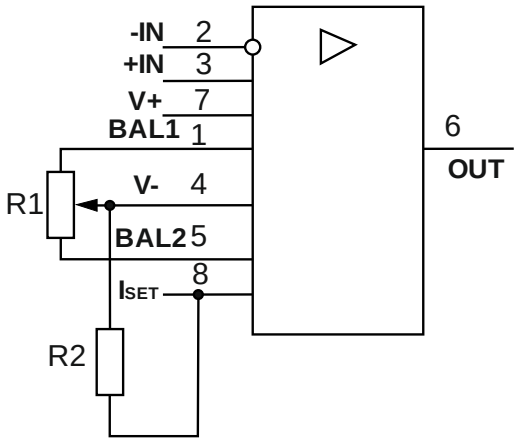
Continuation of Table 1

1	2	3	4	5	6	7
10. Frequency of unit gain, MHz	f_1	0,01		±3	1,5	75
		0,01		±15		
		0,01		±16,5		
		0,1		±3	15	5
		0,1		±15		
		0,1		±16,5		
11. Slew Rate, V/μS	SR	0,01		±3	1,5	75
		0,01		±15		
		0,01		±16,5		
		0,1		±3	15	5
		0,1		±15		
		0,1		±16,5		
12. Temperature coefficient of the Input Offset Current, nA/oC	α_{IIO}	-0,4	0,4	±15	15	5
13. Temperature coefficient of the Input Offset Voltage, μV/ºC	α_{UIO}	-60	60	±15	15	5

Representative Schematic Diagram



Voltage Offset Null Circuit



DA1 - microcircuit K140YD12;
R1 - resistor 100 кΩ ±5%;
R2 - resistor (Table 2).

Table 2

Power supply voltage (U_{CC}), V	Nominal value of resistor (R2), MΩ	Programming current (I_{SET}), μA	Note
±1,5	1,69	1,5	T = (25±5) ^{O}C
	0,169	15	
±3	3,61	1,5	
	0,361	15	
±6	7,5	1,5	
	0,75	15	
±15	20	1,5	
	2	15	
±18	24	1,5	
	2,4	15	

Notes

1 Resistor R2 is connected between terminals 4 and 8.

2 Nominal value of resistor R2 depends on the value of the external reference current Idiv and the voltage U_{CC} in accordance with the formula:

$R2 = (U^{+}_{CC} + U^{-}_{EE} - 0,7) / I_{SET}$

and for two values (1.5 μA and 15 μA) of the programming current is determined from Table 2.

3 It is possible to include resistor R2 between pin 8 and common point. In this case, the value of the resistor is determined by the formula: $R2 = (U^{+}_{CC} - 0,7) / I_{SET}$

4 Instead of resistor R2, it is possible to use an external reference current source, for which internal resistance, determined by the formula:

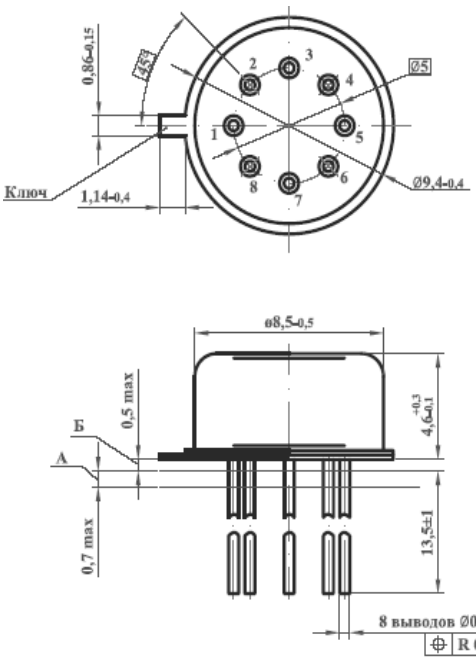
$R_{INT} \approx (25/ I_{SET} + 3,3)$ KΩ,

where I_{SET} is the programming current in microamperes. The voltage drop at this resistance is 0,7 V.

Device type	Package
K140YD1201	TO5-8
K140YD12P	PDIP-8 (300 Mil)
K140YD12T	SOIC-8 (150 Mil)

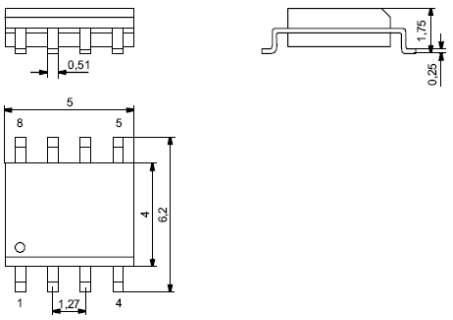
Dimensional drawings of the used cases

K140YD1201
Botton view



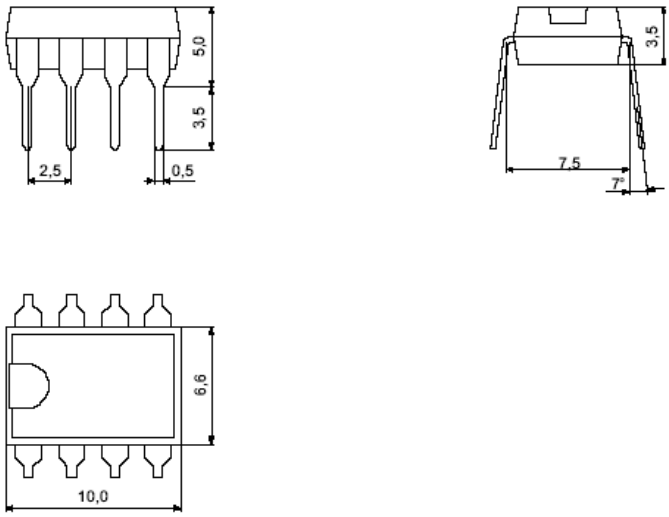
TO5-8 (3101.8-1)
8-lead metal can package
Units, mm

K140YD12T



SOIC-8 (150 Mil)
Units, mm

K140YD12P



PDIP-8 (300 Mil)
Units, mm

Revision history

Date	Revision	Changes
19-Mar-2018	**1**	Preliminary version 1
23-Dec-2020	**2**	Minor changes