TCA0372, TCA0372B

1.0 A Output Current, Dual Power Operational Amplifiers

The TCA0372 is a monolithic circuit intended for use as a power operational amplifier in a wide range of applications, including servo amplifiers and power supplies. No deadband crossover distortion provides better performance for driving coils.

- Output Current to 1.0 A
- Slew Rate of 1.3 V/μs
- Wide Bandwidth of 1.1 MHz
- Internal Thermal Shutdown
- Single or Split Supply Operation
- Excellent Gain and Phase Margins
- Common Mode Input Includes Ground
- Zero Deadband Crossover Distortion

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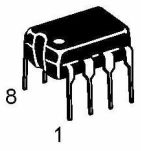
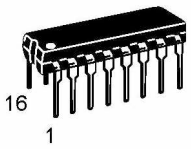
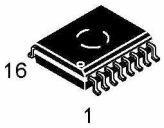


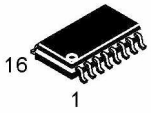
PDIP–8
DP1 SUFFIX
CASE 626



PDIP–16
DP2 SUFFIX
CASE 648



SO–16W
DW SUFFIX
CASE 751G



SOEIAJ–16
DM2 SUFFIX
CASE 966

ORDERING INFORMATION

Device	Package	Shipping
TCA0372DW	SO–16W	47 Units/Rail
TCA0372DWR2	SO–16W	1000 Tape & Reel
TCA0372DP1	PDIP–8	50 Units/Rail
TCA0372BDP1	PDIP–8	50 Units/Rail
TCA0372DP2	PDIP–16	25 Units/Rail
TCA0372DM2EL	SOEIAJ–16	2500 Tape & Reel

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 2593 of this data sheet.

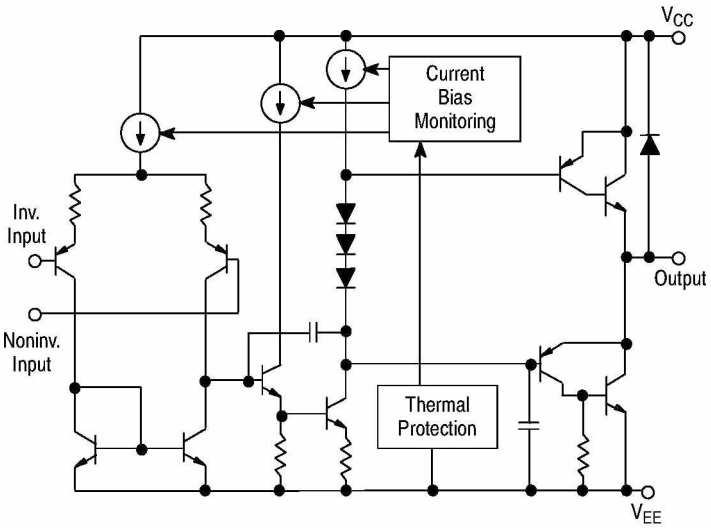
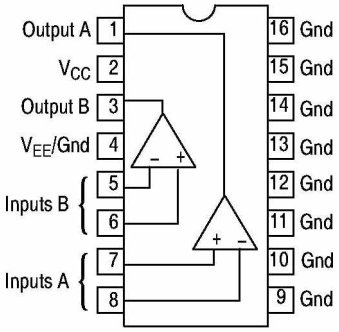


Figure 1. Representative Block Diagram

PIN CONNECTIONS

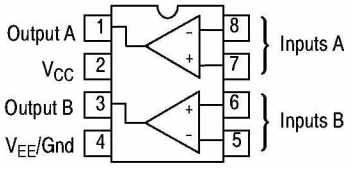
CASE 648



(Top View)

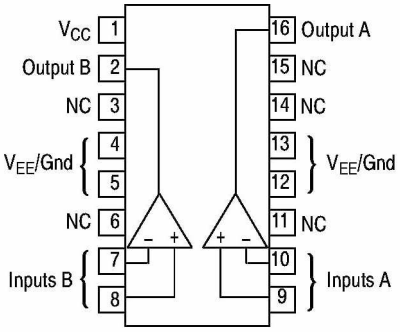
*Pins 4 and 9 to 16 are internally connected.

CASE 626



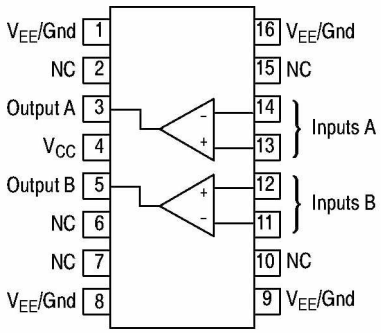
(Top View)

CASE 751G



(Top View)

CASE 966



(Top View)

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Supply Voltage (from V_{CC} to V_{EE})	V_S	40	V
Input Differential Voltage Range	V_{IDR}	Note 1	V
Input Voltage Range	V_{IR}	Note 1	V
Junction Temperature (Note 2)	T_J	+150	°C
Storage Temperature Range	T_{stg}	–55 to +150	°C
DC Output Current	I_O	1.0	A
Peak Output Current (Nonrepetitive)	$I_{(max)}$	1.5	A

1. Either or both input voltages should not exceed the magnitude of V_{CC} or V_{EE}.
2. Power dissipation must be considered to ensure maximum junction temperature (T_J) is not exceeded.

DC ELECTRICAL CHARACTERISTICS (V_{CC} = +15 V, V_{EE} = –15 V, R_L connected to ground, T_J = –40° to +125°C.)

Characteristics	Symbol	Min	Typ	Max	Unit
Input Offset Voltage (V_{CM} = 0) T_J = +25°C T_J, T_{low} to T_{high}	V_{IO}	 – –	 1.0 –	 15 20	mV
Average Temperature Coefficient of Offset Voltage	$\Delta V_{IO}/\Delta T$	–	20	–	μV/°C
Input Bias Current (V_{CM} = 0)	I_{IB}	–	100	500	nA
Input Offset Current (V_{CM} = 0)	I_{IO}	–	10	50	nA
Large Signal Voltage Gain V_O = ±10 V, R_L = 2.0 k	A_{VOL}	30	100	–	V/mV
Output Voltage Swing (I_L = 100 mA) T_J = +25°C T_J = T_{low} to T_{high} T_J = +25°C T_J = T_{low} to T_{high}	V_{OH} V_{OL}	 14.0 13.9 – –	 14.2 – –14.2 –	 – – –14.0 –13.9	V
Output Voltage Swing (I_L = 1.0 A) V_{CC} = +24 V, V_{EE} = 0 V, T_J = +25°C V_{CC} = +24 V, V_{EE} = 0 V, T_J = T_{low} to T_{high} V_{CC} = +24 V, V_{EE} = 0 V, T_J = +25°C V_{CC} = +24 V, V_{EE} = 0 V, T_J = T_{low} to T_{high}	V_{OH} V_{OL}	 22.5 22.5 – –	 22.7 – 1.3 –	 – – 1.5 1.5	V
Input Common Mode Voltage Range T_J = +25°C T_J = T_{low} to T_{high}	V_{ICR}	 V_{EE} to (V_{CC} –1.0) V_{EE} to (V_{CC} –1.3)			V
Common Mode Rejection Ratio (R_S = 10 k)	CMRR	70	90	–	dB
Power Supply Rejection Ratio (R_S = 100 Ω)	PSRR	70	90	–	dB
Power Supply Current T_J = +25°C TCA0372 TCA0372B T_J = T_{low} to T_{high} TCA0372 TCA0372B	I_D	 – – – –	 5.0 8.0 – –	 10 10 14 14	mA

AC ELECTRICAL CHARACTERISTICS (V_{CC} = +15 V, V_{EE} = –15 V, R_L connected to ground, T_J = +25°C, unless otherwise noted.)

Characteristics	Symbol	Min	Typ	Max	Unit
Slew Rate (V_{in} = –10 V to +10 V, R_L = 2.0 k, C_L = 100 pF) A_V = –1.0, T_J = T_{low} to T_{high}	SR	1.0	1.4	–	V/μs
Gain Bandwidth Product (f = 100 kHz, C_L = 100 pF, R_L = 2.0 k) T_J = 25°C T_J = T_{low} to T_{high}	GBW	 0.9 0.7	 1.4 –	 – –	MHz
Phase Margin T_J = T_{low} to T_{high} R_L = 2.0 k, C_L = 100 pF	ϕ_m	–	65	–	Degrees
Gain Margin R_L = 2.0 k, C_L = 100 pF	A_m	–	15	–	dB
Equivalent Input Noise Voltage R_S = 100 Ω, f = 1.0 to 100 kHz	e_n	–	22	–	nV/$\sqrt{Hz}$
Total Harmonic Distortion A_V = –1.0, R_L = 50 Ω, V_O = 0.5 VRMS, f = 1.0 kHz	THD	–	0.02	–	%

NOTE: In case V_{EE} is disconnected before V_{CC}, a diode between V_{EE} and Ground is recommended to avoid damaging the device.

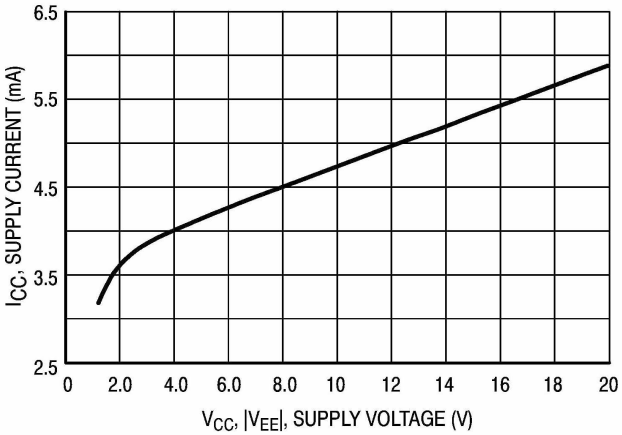


Figure 2. Supply Current versus Suppy Voltage with No Load

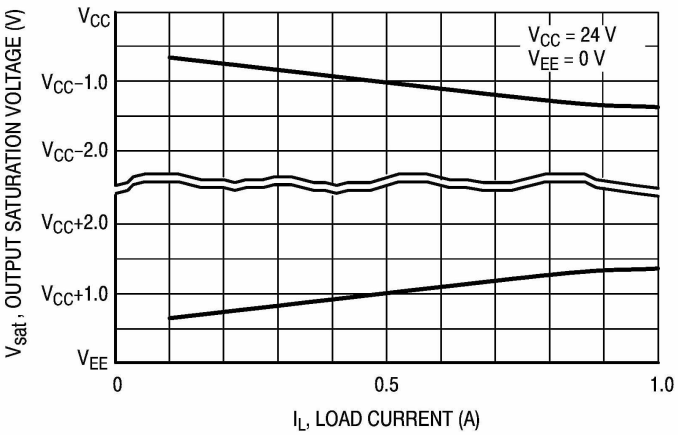


Figure 3. Output Saturation Voltage versus Load Current

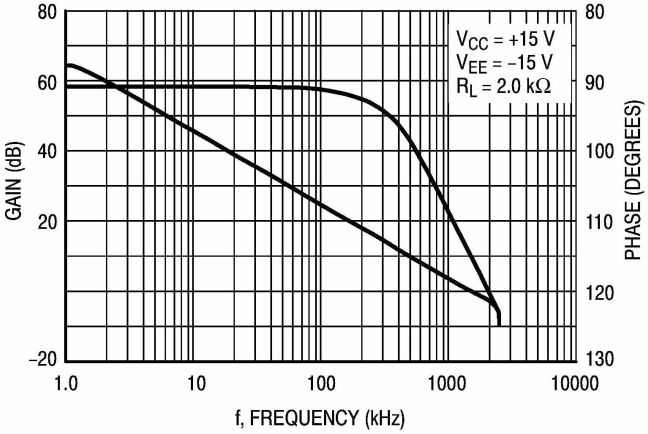


Figure 4. Voltage Gain and Phase versus Frequency

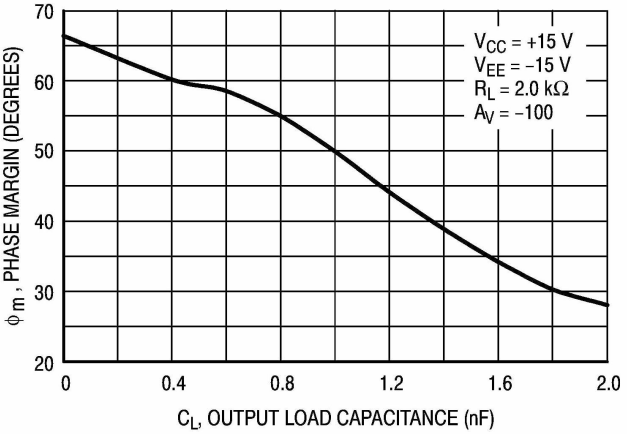


Figure 5. Phase Margin versus Output Load Capacitance

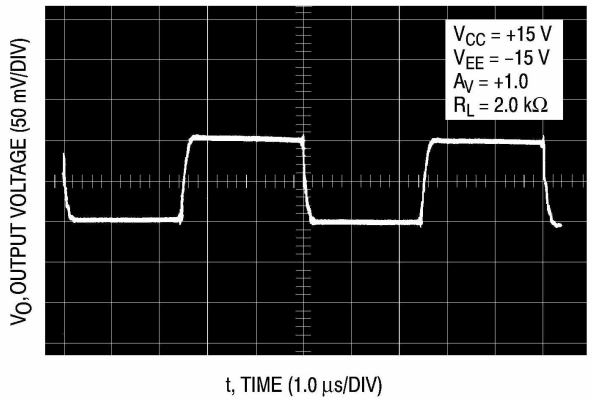


Figure 6. Small Signal Transient Response

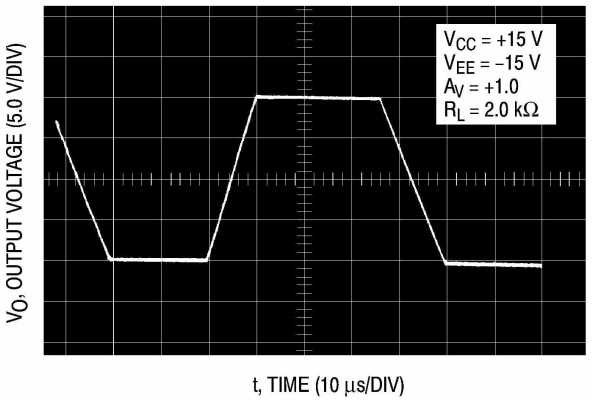


Figure 7. Large Signal Transient Response

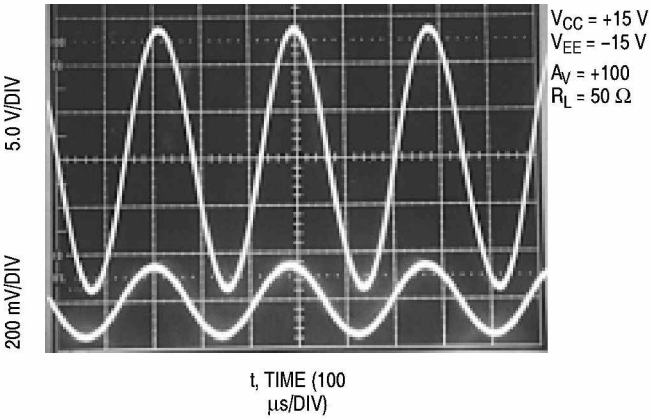


Figure 8. Sine Wave Reponse

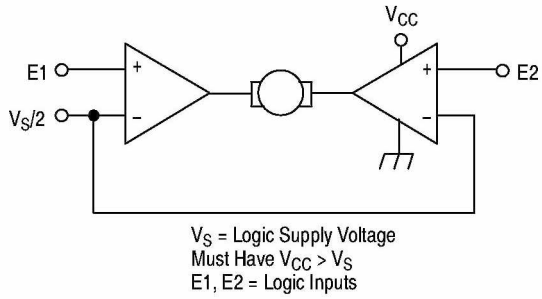
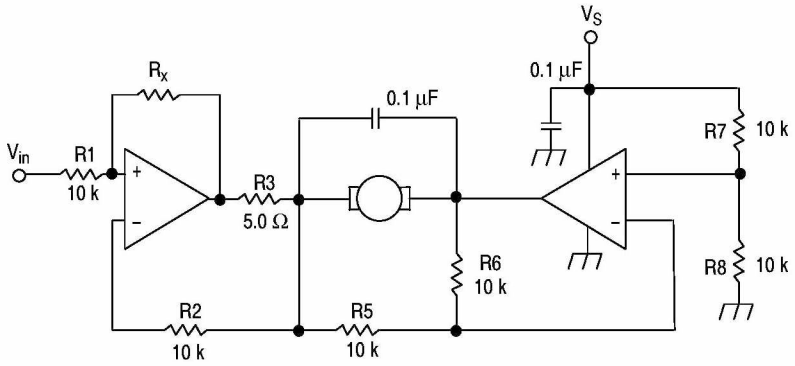


Figure 9. Bidirectional DC Motor Control with Microprocessor–Compatible Inputs



For circuit stability, ensure that $R_x > \frac{2R3 \cdot R1}{R_M}$ where, R_M = internal resistance of motor.

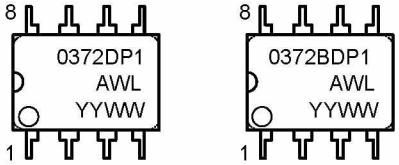
The voltage available at the terminals of the motor is: $V_M = 2\left(V_1 - \frac{V_S}{2}\right) + |R_o| \cdot I_M$

where, $|R_o| = \frac{2R3 \cdot R1}{R_x}$ and I_M is the motor current.

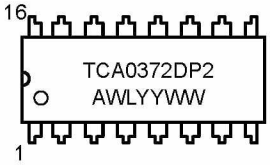
Figure 10. Bidirectional Speed Control of DC Motors

MARKING DIAGRAMS

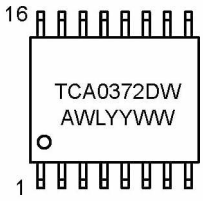
PDIP–8
DP1 SUFFIX
CASE 626



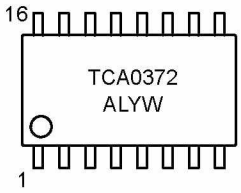
PDIP–16
DP2 SUFFIX
CASE 648



SO–16W
DW SUFFIX
CASE 751G



SOEIAJ–16
DM2 SUFFIX
CASE 966



A	= Assembly Location
WL, L	= Wafer Lot
YY, Y	= Year
WW, W	= Work Week