Rochester Electronics

Datasheet

Rochester Electronics Manufactured Components

Rochester branded components are manufactured using either die/wafers purchased from the original suppliers or Rochester wafers recreated from the original IP. All recreations are done with the approval of the OCM.

Parts are tested using original factory test programs or Rochester developed test solutions to guarantee product meets or exceed the OCM data sheet.

Quality Overview

- ISO-9001
- AS9120 certification
- Qualified Manufacturers List (QML) MIL-PRF-35835
  - Class Q Military
  - Class V Space Level
- Qualified Suppliers List of Distributors (QSLD)
  - Rochester is a critical supplier to DLA and meets all industry and DLA standards.

Rochester Electronics, LLC is committed to supplying products that satisfy customer expectations for quality and are equal to those originally supplied by industry manufacturers.

The original manufacturer's datasheet accompanying this document reflects the performance and specifications of the Rochester manufactured version of this device. Rochester Electronics guarantees the performance of its semiconductor products to the original OEM specifications. 'Typical' values are for reference purposes only. Certain minimum or maximum ratings may be based on product characterization, design, simulation, or sample testing.

TCA0372, TCA0372B

1.0 A Output Current, Dual Power Operational Amplifiers

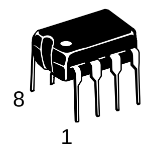
The TCA0372 is a monolithic circuit intended for use as a power operational amplifier in a wide range of applications, including servo amplifiers and power supplies. No deadband crossover distortion provides better performance for driving coils.

Features

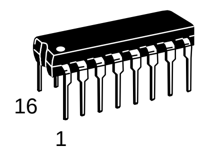
- Output Current to 1.0 A
- Slew Rate of 1.3 V/μs
- Wide Bandwidth of 1.1 MHz
- Internal Thermal Shutdown
- Single or Split Supply Operation
- Excellent Gain and Phase Margins
- Common Mode Input Includes Ground
- Zero Deadband Crossover Distortion
- Pb−Free Packages are Available*

ON Semiconductor®

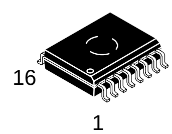
http://onsemi.com



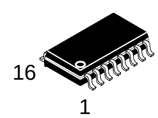
PDIP−8
DP1 SUFFIX
CASE 626



PDIP−16
DP2 SUFFIX
CASE 648



SOIC−16W
DW SUFFIX
CASE 751G



SOEIAJ−16
DM2 SUFFIX
CASE 966

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 6 of this data sheet.

DEVICE MARKING INFORMATION

See general marking information in the device marking section on page 6 of this data sheet.

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

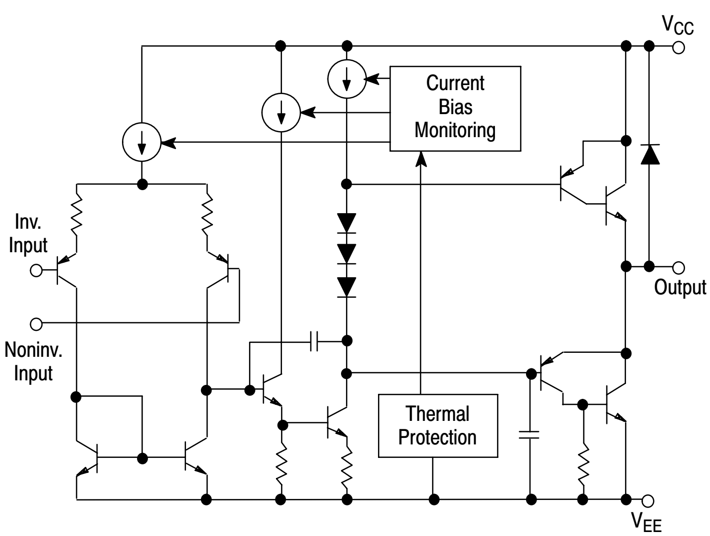


Figure 1. Representative Block Diagram

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
Operating Temperature Range	T_A	−40 to +125	°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
Thermal Resistance, Junction−to−Air Case 626 Case 648 Case 751G	$R_{\theta JA}$	 137 72 80	°C/W
Thermal Resistance, Junction−to−Case Case 626 Case 648 Case 751G	$R_{\theta JC}$	 23 10 12	°C/W

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

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_A = −40° to +125°C.)

Characteristics	Symbol	Min	Typ	Max	Unit
Input Offset Voltage (V_{CM} = 0) T_A = +25°C T_A, 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_A = +25°C T_A = T_{low} to T_{high} T_A = +25°C T_A = 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_A = +25°C V_{CC} = +24 V, V_{EE} = 0 V, T_A = T_{low} to T_{high} V_{CC} = +24 V, V_{EE} = 0 V, T_A = +25°C V_{CC} = +24 V, V_{EE} = 0 V, T_A = 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_A = +25°C T_A = 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_A = +25°C TCA0372 TCA0372B T_A = 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_A = +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_A = 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_A = 25°C T_A = 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.

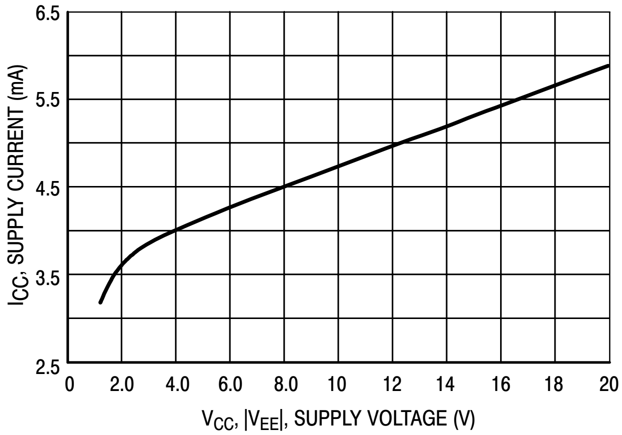


Figure 2. Supply Current versus Supply Voltage with No Load

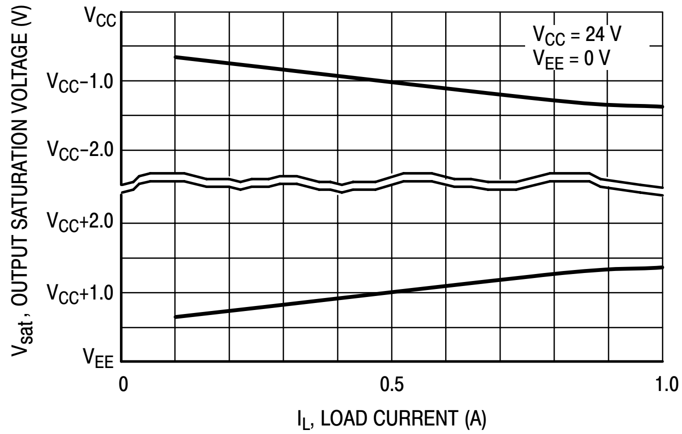


Figure 3. Output Saturation Voltage versus Load Current

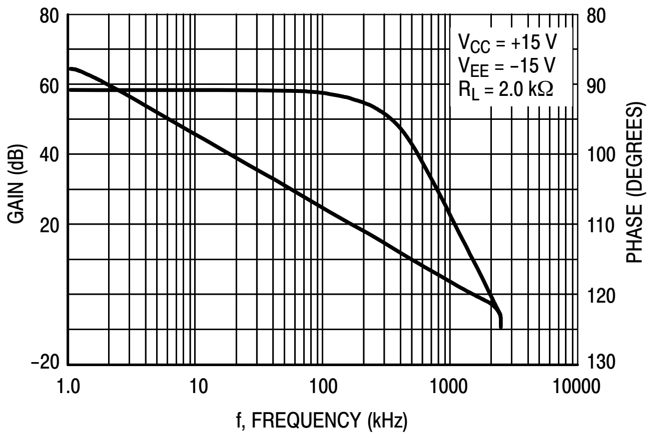


Figure 4. Voltage Gain and Phase versus Frequency

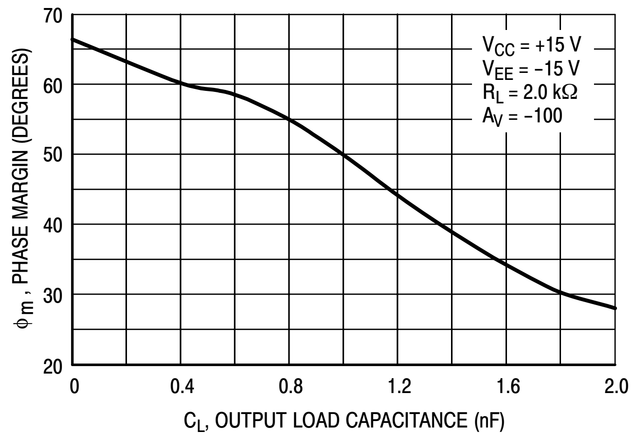


Figure 5. Phase Margin versus Output Load Capacitance

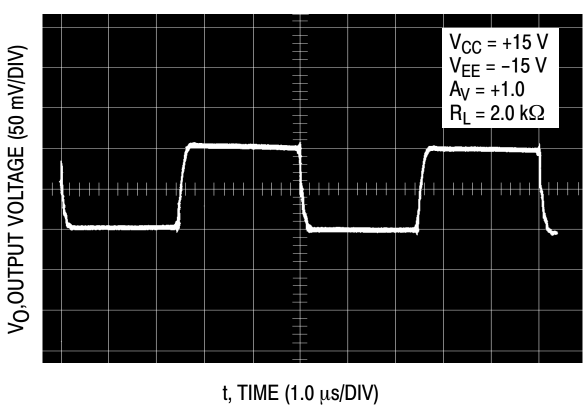


Figure 6. Small Signal Transient Response

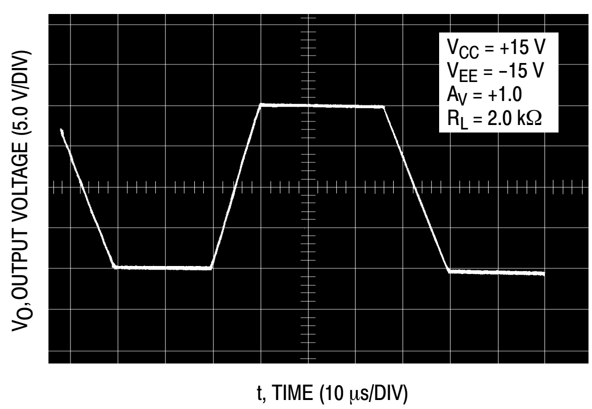


Figure 7. Large Signal Transient Response

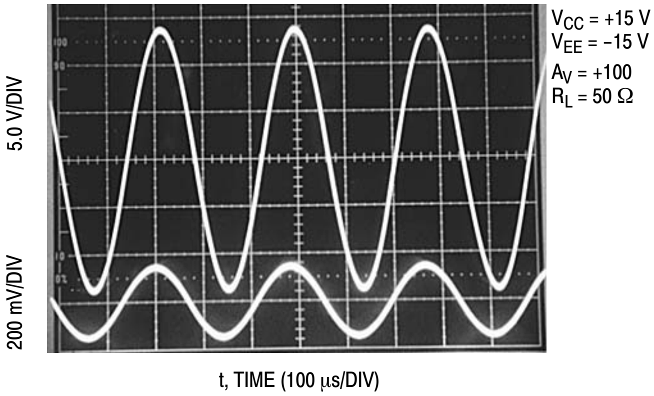


Figure 8. Sine Wave Response

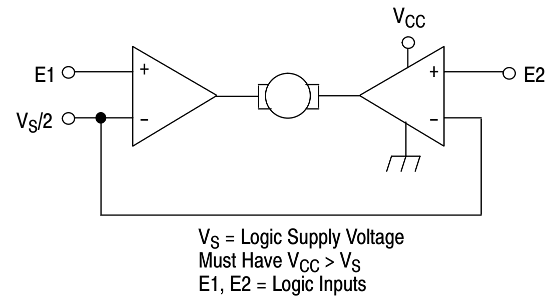
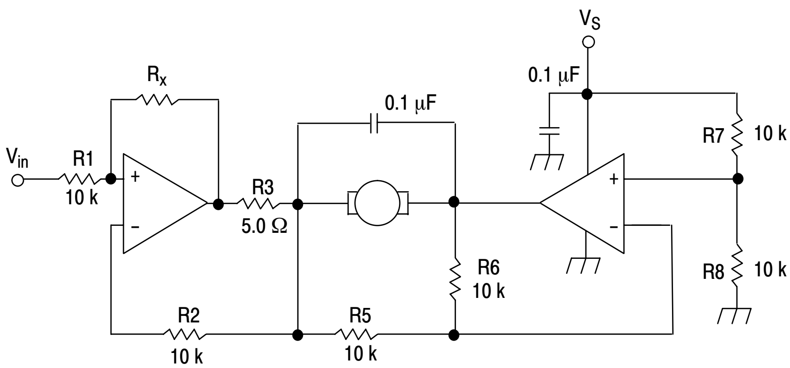


Figure 9. Bidirectional DC Motor Control with Microprocessor−Compatible Inputs



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

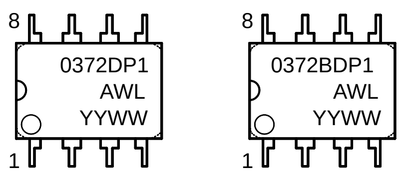
ORDERING INFORMATION

Device	Package	Shipping†
TCA0372DW	SOIC−16W	47 Units / Rail
TCA0372DWG	SOIC−16W (Pb−Free)	47 Units / Rail
TCA0372DWR2	SOIC−16W	1000 Tape & Reel
TCA0372DWR2G	SOIC−16W (Pb−Free)	1000 Tape & Reel
TCA0372BDWR2	SOIC−16W	1000 Tape & Reel
TCA0372BDWR2G	SOIC−16W (Pb−Free)	1000 Tape & Reel
TCA0372DP1	PDIP−8	50 Units / Rail
TCA0372DP1G	PDIP−8 (Pb−Free)	50 Units / Rail
TCA0372BDP1	PDIP−8	50 Units / Rail
TCA0372BDP1G	PDIP−8 (Pb−Free)	50 Units / Rail
TCA0372DP2	PDIP−16	25 Units / Rail
TCA0372DP2G	PDIP−16 (Pb−Free)	25 Units / Rail
TCA0372DM2EL	SOEIAJ−16	2500 Tape & Reel
TCA0372DM2ELG	SOEIAJ−16 (Pb−Free)	2500 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

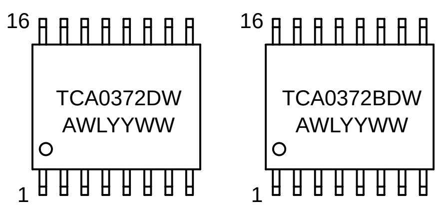
MARKING DIAGRAMS

PDIP−8
DP1 SUFFIX
CASE 626

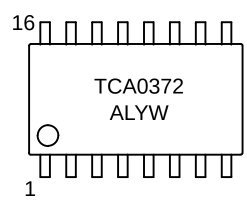


PDIP−16
DP2 SUFFIX
CASE 648

SOIC−16W
DW SUFFIX
CASE 751G



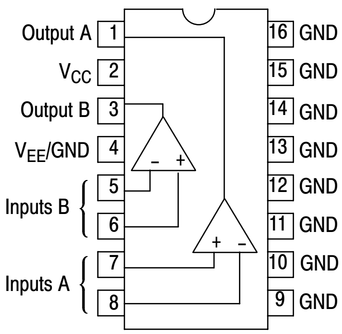
SOEIAJ−16
DM2 SUFFIX
CASE 966



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

PIN CONNECTIONS

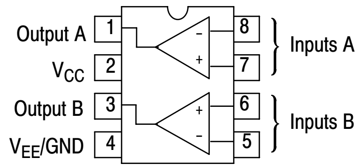
CASE 648



(Top View)

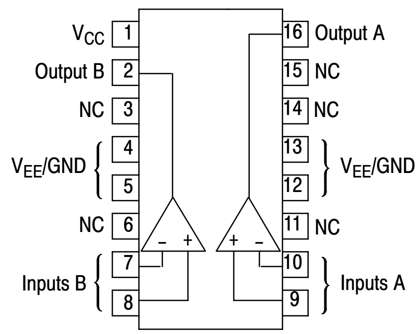
*Pins 4 and 9 to 16 are internally connected.

CASE 626



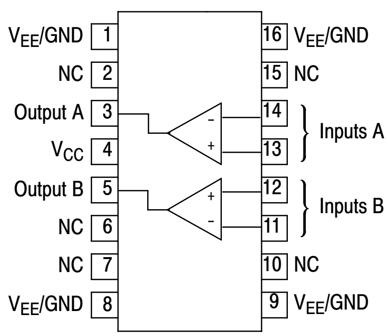
(Top View)

CASE 751G



(Top View)

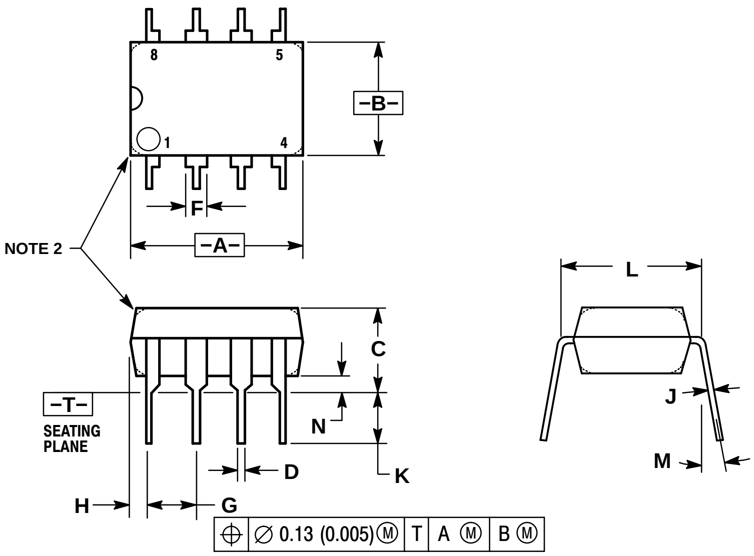
CASE 966



(Top View)

PACKAGE DIMENSIONS

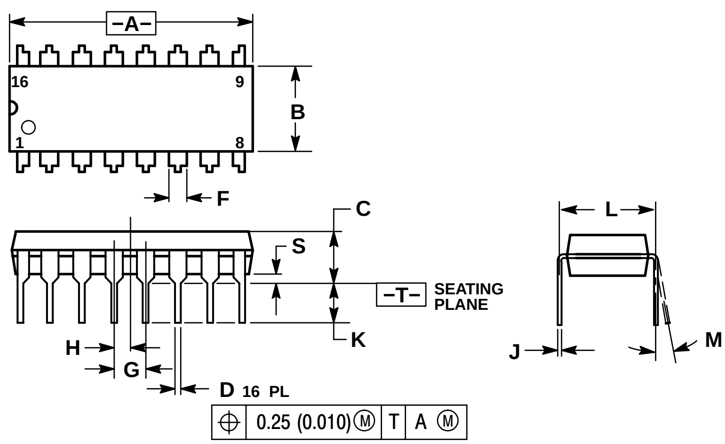
PDIP−8
DP1 SUFFIX
CASE 626−05
ISSUE L



NOTES:
1. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.
2. PACKAGE CONTOUR OPTIONAL (ROUND OR SQUARE CORNERS).
3. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.40	10.16	0.370	0.400
B	6.10	6.60	0.240	0.260
C	3.94	4.45	0.155	0.175
D	0.38	0.51	0.015	0.020
F	1.02	1.78	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	0.76	1.27	0.030	0.050
J	0.20	0.30	0.008	0.012
K	2.92	3.43	0.115	0.135
L	7.62 BSC		0.300 BSC	
M	---	10°	---	10°
N	0.76	1.01	0.030	0.040

PDIP−16
DP2 SUFFIX
CASE 648−08
ISSUE T

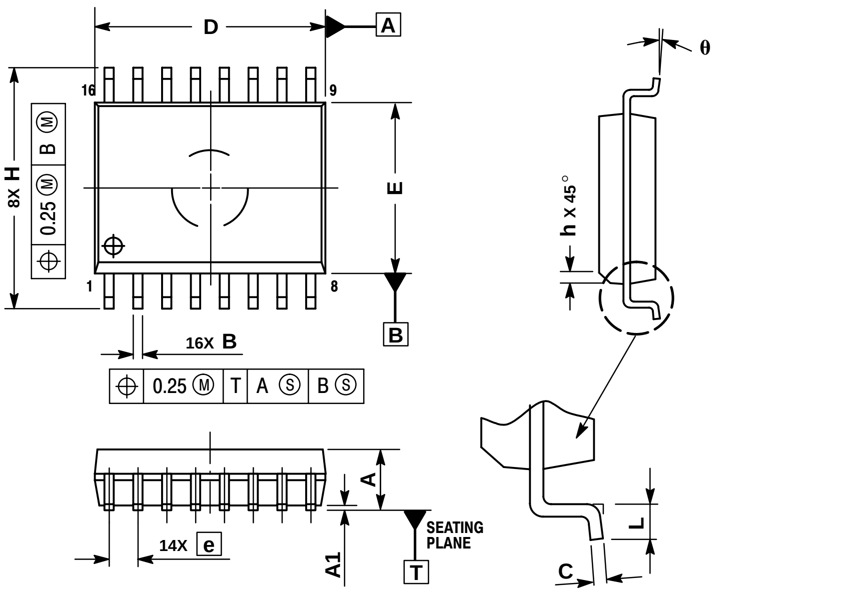


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEADS WHEN FORMED PARALLEL.
4. DIMENSION B DOES NOT INCLUDE MOLD FLASH.
5. ROUNDED CORNERS OPTIONAL.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.740	0.770	18.80	19.55
B	0.250	0.270	6.35	6.85
C	0.145	0.175	3.69	4.44
D	0.015	0.021	0.39	0.53
F	0.040	0.70	1.02	1.77
G	0.100 BSC		2.54 BSC	
H	0.050 BSC		1.27 BSC	
J	0.008	0.015	0.21	0.38
K	0.110	0.130	2.80	3.30
L	0.295	0.305	7.50	7.74
M	0°	10°	0°	10°
S	0.020	0.040	0.51	1.01

PACKAGE DIMENSIONS

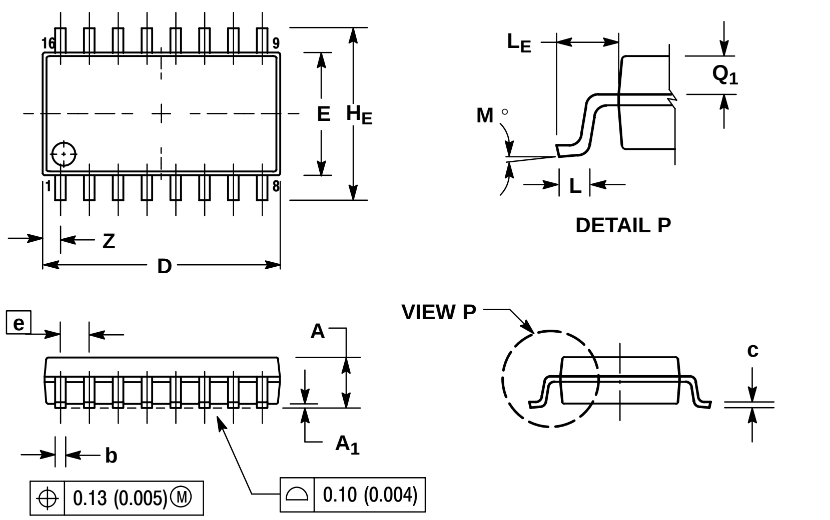
SOIC−16W
DW SUFFIX
CASE 751G−03
ISSUE B



NOTES:
1. DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994.
3. DIMENSIONS D AND E DO NOT INLCUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 PER SIDE.
5. DIMENSION B DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.13 TOTAL IN EXCESS OF THE B DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS	
DIM	MIN	MAX
A	2.35	2.65
A1	0.10	0.25
B	0.35	0.49
C	0.23	0.32
D	10.15	10.45
E	7.40	7.60
e	1.27 BSC	
H	10.05	10.55
h	0.25	0.75
L	0.50	0.90
θ	0 °	7 °

SOEIAJ−16
DM2 SUFFIX
CASE 966−01
ISSUE O



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS AND ARE MEASURED AT THE PARTING LINE. MOLD FLASH OR PROTRUSIONS SHALL NOT EXCEED 0.15 (0.006) PER SIDE.
4. TERMINAL NUMBERS ARE SHOWN FOR REFERENCE ONLY.
5. THE LEAD WIDTH DIMENSION (b) DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 (0.003) TOTAL IN EXCESS OF THE LEAD WIDTH DIMENSION AT MAXIMUM MATERIAL CONDITION. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE FOOT. MINIMUM SPACE BETWEEN PROTRUSIONS AND ADJACENT LEAD TO BE 0.46 (0.018).

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	---	2.05	---	0.081
A_1	0.05	0.20	0.002	0.008
b	0.35	0.50	0.014	0.020
c	0.18	0.27	0.007	0.011
D	9.90	10.50	0.390	0.413
E	5.10	5.45	0.201	0.215
e	1.27 BSC		0.050 BSC	
H_E	7.40	8.20	0.291	0.323
L	0.50	0.85	0.020	0.033
L_E	1.10	1.50	0.043	0.059
M	0 °	10 °	0 °	10 °
Q_1	0.70	0.90	0.028	0.035
Z	---	0.78	---	0.031

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
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Email: orderlit@onsemi.com

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2−9−1 Kamimeguro, Meguro−ku, Tokyo, Japan 153−0051
Phone: 81−3−5773−3850

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