



# 6-Pin DIP Optoisolators Transistor Output

The CNY17-1, CNY17-2 and CNY17-3 devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector.

- Closely Matched Current Transfer Ratio (CTR) to Minimize Unit-to-Unit Variation
- Guaranteed 70 Volt  $V_{(BR)CEO}$  Minimum
- **To order devices that are tested and marked per VDE 0884 requirements, the suffix "V" must be included at end of part number. VDE 0884 is a test option.**

### Applications

- Feedback Control Circuits, Open Loop Gain Control in Power Supplies
- Interfacing and coupling systems of different potentials and impedances
- General Purpose Switching Circuits
- Monitor and Detection Circuits

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
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#### INPUT LED

Reverse Voltage	$V_R$	6	Volts
Forward Current — Continuous	$I_F$	60	mA
Forward Current — Pk (PW = 1 $\mu\text{s}$ , 330 pps)	$I_{F(pk)}$	1.5	A
LED Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power in Output Detector Derate above $25^\circ\text{C}$	$P_D$	120	mW
		1.41	mW/ $^\circ\text{C}$

#### OUTPUT TRANSISTOR

Collector-Emitter Voltage	$V_{CEO}$	70	Volts
Emitter-Base Voltage	$V_{EBO}$	7	Volts
Collector-Base Voltage	$V_{CBO}$	70	Volts
Collector Current — Continuous	$I_C$	100	mA
Detector Power Dissipation @ $T_A = 25^\circ\text{C}$ with Negligible Power in Input LED Derate above $25^\circ\text{C}$	$P_D$	150	mW
		1.76	mW/ $^\circ\text{C}$

#### TOTAL DEVICE

Isolation Surge Voltage <sup>(1)</sup> (Peak ac Voltage, 60 Hz, 1 sec Duration)	$V_{ISO}$	7500	Vac(pk)
Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	250	mW
		2.94	mW/ $^\circ\text{C}$
Ambient Operating Temperature Range <sup>(2)</sup>	$T_A$	-55 to +100	$^\circ\text{C}$
Storage Temperature Range <sup>(2)</sup>	$T_{stg}$	-55 to +150	$^\circ\text{C}$
Soldering Temperature (10 sec, 1/16" from case)	$T_L$	260	$^\circ\text{C}$

1. Isolation surge voltage is an internal device dielectric breakdown rating.  
For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.
2. Refer to Quality and Reliability Section in Opto Data Book for information on test conditions.

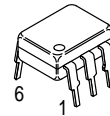
**Preferred** devices are Motorola recommended choices for future use and best overall value.

GlobalOptoisolator is a trademark of Motorola, Inc.

**CNY17-1**  
[CTR = 40–80%]  
**CNY17-2\***  
[CTR = 63–125%]  
**CNY17-3\***  
[CTR = 100–200%]

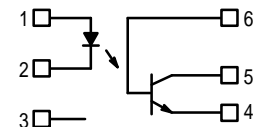
\*Motorola Preferred Devices

### STYLE 1 PLASTIC



STANDARD THRU HOLE  
CASE 730A-04

### SCHEMATIC



- PIN 1. LED ANODE  
2. LED CATHODE  
3. N.C.  
4. EMITTER  
5. COLLECTOR  
6. BASE

# CNY17-1 CNY17-2 CNY17-3

## ELECTRICAL CHARACTERISTICS (T<sub>A</sub> = 25°C unless otherwise noted)<sup>(1)</sup>

Characteristic	Symbol	Min	Typ	Max	Unit	
<b>INPUT LED</b>						
Forward Voltage (I <sub>F</sub> = 60 mA)	T <sub>A</sub> = 25°C T <sub>A</sub> = -55°C T <sub>A</sub> = 100°C	V <sub>F</sub>	— — —	1.35 1.5 1.25	1.65 — —	Volts
Reverse Leakage Current (V <sub>R</sub> = 6 V)		I <sub>R</sub>	—	—	10	μA
Capacitance (V = 0, f = 1 MHz)		C <sub>J</sub>	—	18	—	pF

## OUTPUT TRANSISTOR

Collector–Emitter Dark Current (V <sub>CE</sub> = 10 V, T <sub>A</sub> = 25°C)	CNY17–1,2 CNY17–3	I <sub>CEO</sub>	— —	5 5	50 100	nA
(V <sub>CE</sub> = 10 V, T <sub>A</sub> = 100°C)	All devices	I <sub>CEO</sub>	—	1.6	—	μA
Collector–Base Dark Current (V <sub>CB</sub> = 10 V)		I <sub>CBO</sub>	—	0.5	—	nA
Collector–Emitter Breakdown Voltage (I <sub>C</sub> = 1 mA)		V <sub>(BR)CEO</sub>	70	120	—	Volts
Collector–Base Breakdown Voltage (I <sub>C</sub> = 100 μA)		V <sub>(BR)CBO</sub>	70	120	—	Volts
Emitter–Base Breakdown Voltage (I <sub>E</sub> = 100 μA)		V <sub>(BR)EBO</sub>	7	7.8	—	Volts
DC Current Gain (I <sub>C</sub> = 2 mA, V <sub>CE</sub> = 5 V) (Typical Value)		h <sub>FE</sub>	—	400	—	—
Collector–Emitter Capacitance (f = 1 MHz, V <sub>CE</sub> = 0)		C <sub>CE</sub>	—	8	—	pF
Collector–Base Capacitance (f = 1 MHz, V <sub>CB</sub> = 0)		C <sub>CB</sub>	—	21	—	pF
Emitter–Base Capacitance (f = 1 MHz, V <sub>EB</sub> = 0)		C <sub>EB</sub>	—	8	—	pF

## COUPLED

Output Collector Current (I <sub>F</sub> = 10 mA, V <sub>CE</sub> = 5 V)	CNY17–1 CNY17–2 CNY17–3	I <sub>C</sub> (CTR) <sup>(2)</sup>	4 (40) 6.3 (63) 10 (100)	6 (60) 10 (100) 15 (150)	8 (80) 12.5 (125) 20 (200)	mA (%)
Collector–Emitter Saturation Voltage (I <sub>C</sub> = 2.5 mA, I <sub>F</sub> = 10 mA)		V <sub>CE(sat)</sub>	—	0.18	0.4	Volts
Delay Time (I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 75 Ω, Figure 11)		t <sub>d</sub>	—	1.6	5.6	μs
Rise Time (I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 75 Ω, Figure 11)		t <sub>r</sub>	—	1.6	4	μs
Storage Time (I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 75 Ω, Figure 11)		t <sub>s</sub>	—	0.7	4.1	μs
Fall Time (I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 75 Ω, Figure 11)		t <sub>f</sub>	—	2.3	3.5	μs
Delay Time (I <sub>F</sub> = 20 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 1 kΩ) <sup>(3)</sup> (I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 1 kΩ) <sup>(3)</sup>	CNY17–1 CNY17–2,3	t <sub>d</sub>	— —	1.2 1.8	5.5 8	μs
Rise Time (I <sub>F</sub> = 20 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 1 kΩ) <sup>(3)</sup> (I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 1 kΩ) <sup>(3)</sup>	CNY17–1 CNY17–2,3	t <sub>r</sub>	— —	3.3 5	4 6	μs
Storage Time (I <sub>F</sub> = 20 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 1 kΩ) <sup>(3)</sup> (I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 1 kΩ) <sup>(3)</sup>	CNY17–1 CNY17–2,3	t <sub>s</sub>	— —	4.4 2, 7	34 39	μs
Fall Time (I <sub>F</sub> = 20 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 1 kΩ) <sup>(3)</sup> (I <sub>F</sub> = 10 mA, V <sub>CC</sub> = 5 V, R <sub>L</sub> = 1 kΩ) <sup>(3)</sup>	CNY17–1 CNY17–2,3	t <sub>f</sub>	— —	9.7 9.4, 20	20 24	μs
Isolation Voltage (f = 60 Hz, t = 1 sec) <sup>(4)</sup>		V <sub>ISO</sub>	7500	—	—	Vac(pk)
Isolation Resistance (V = 500 V) <sup>(4)</sup>		R <sub>ISO</sub>	10 <sup>11</sup>	—	—	Ω
Isolation Capacitance (V = 0, f = 1 MHz) <sup>(4)</sup>		C <sub>ISO</sub>	—	0.2	0.5	pF

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. Current Transfer Ratio (CTR) = I<sub>C</sub>/I<sub>F</sub> x 100%.
3. For test circuit setup and waveforms, refer to Figure 11.
4. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

TYPICAL CHARACTERISTICS

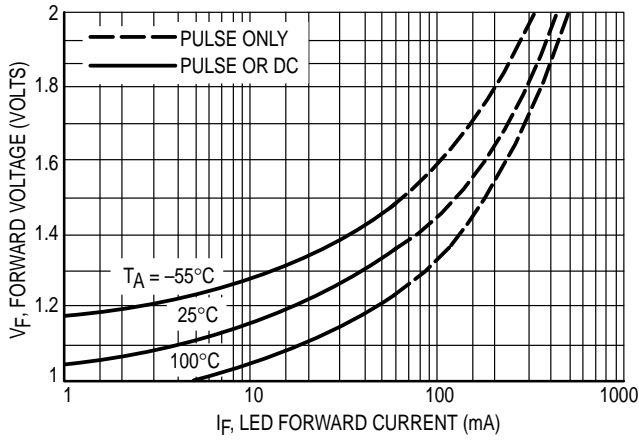


Figure 1. LED Forward Voltage versus Forward Current

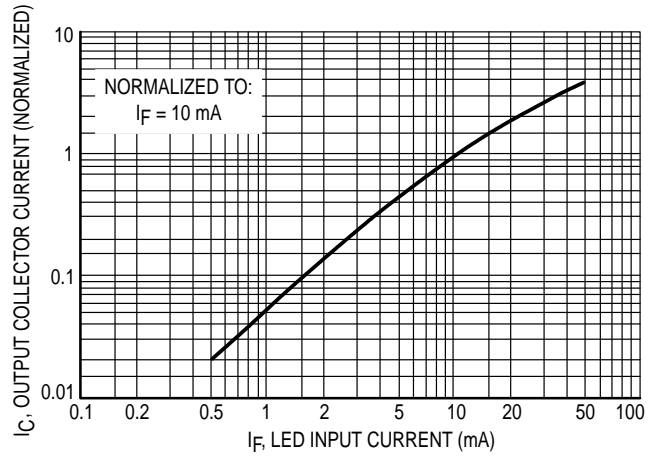


Figure 2. Output Current versus Input Current

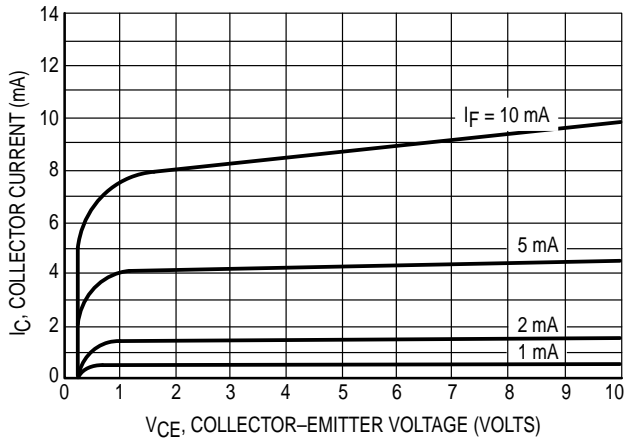


Figure 3. Collector Current versus Collector-Emitter Voltage

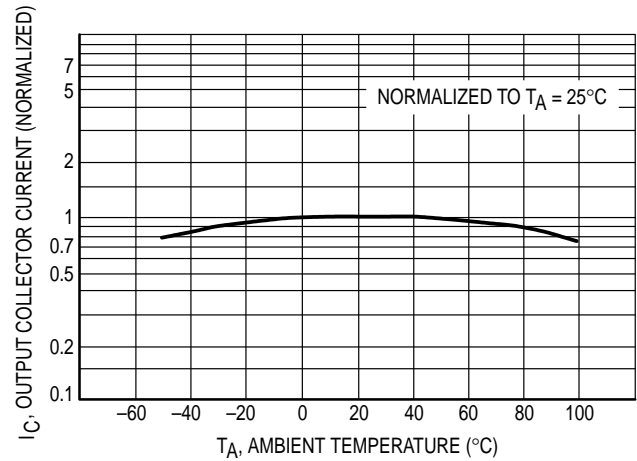


Figure 4. Output Current versus Ambient Temperature

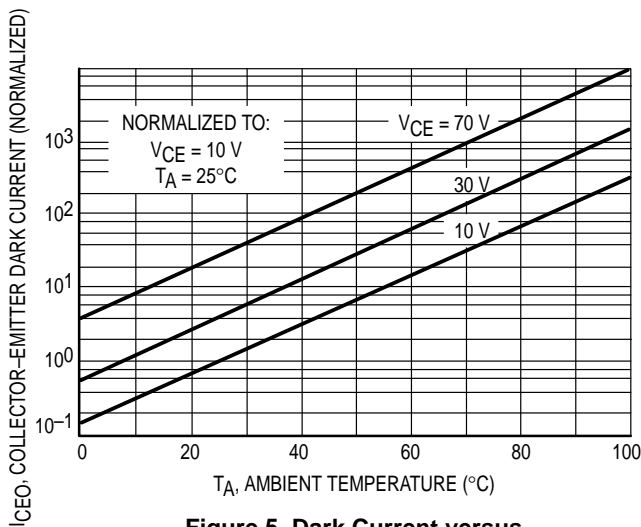


Figure 5. Dark Current versus Ambient Temperature

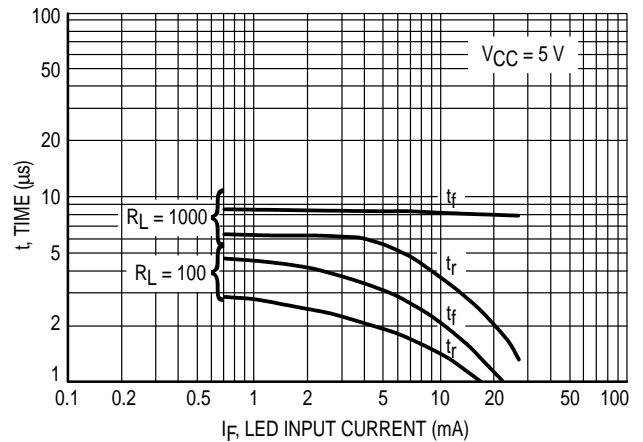


Figure 6. Rise and Fall Times CNY17-1 and CNY17-2

# CNY17-1 CNY17-2 CNY17-3

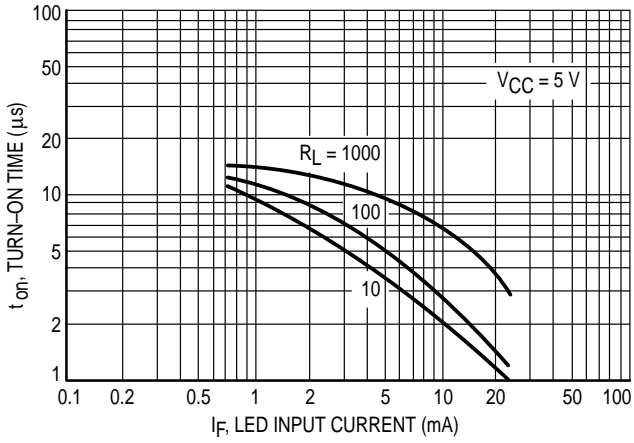


Figure 7. Turn-On Switching Times

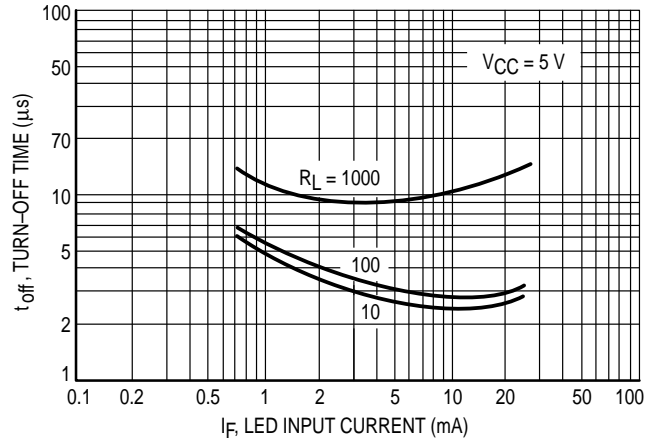


Figure 8. Turn-Off Switching Times  
CNY17-1 and CNY17-2

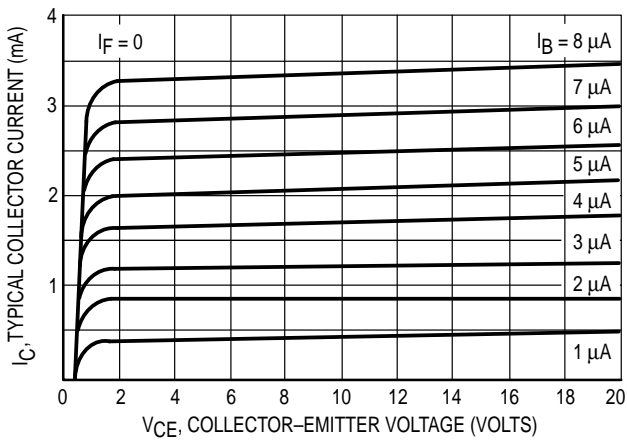


Figure 9. DC Current Gain (Detector Only)

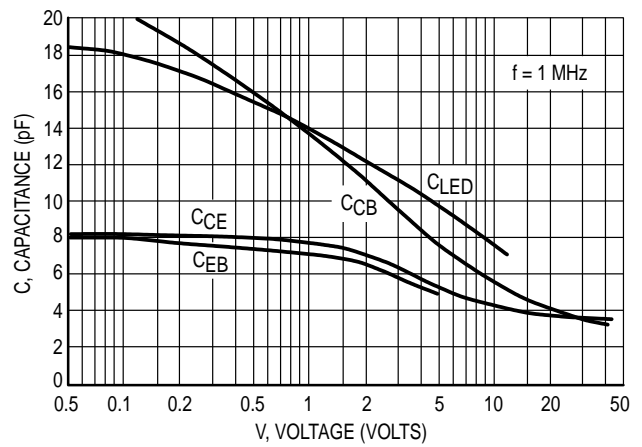


Figure 10. Capacitances versus Voltage

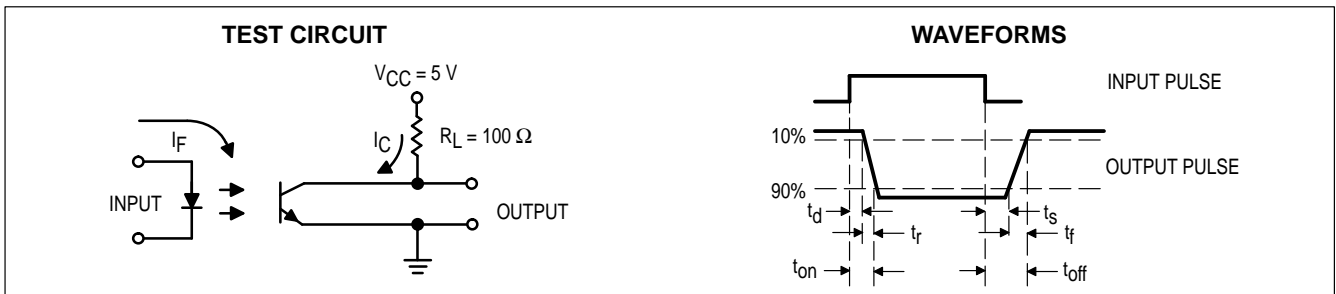
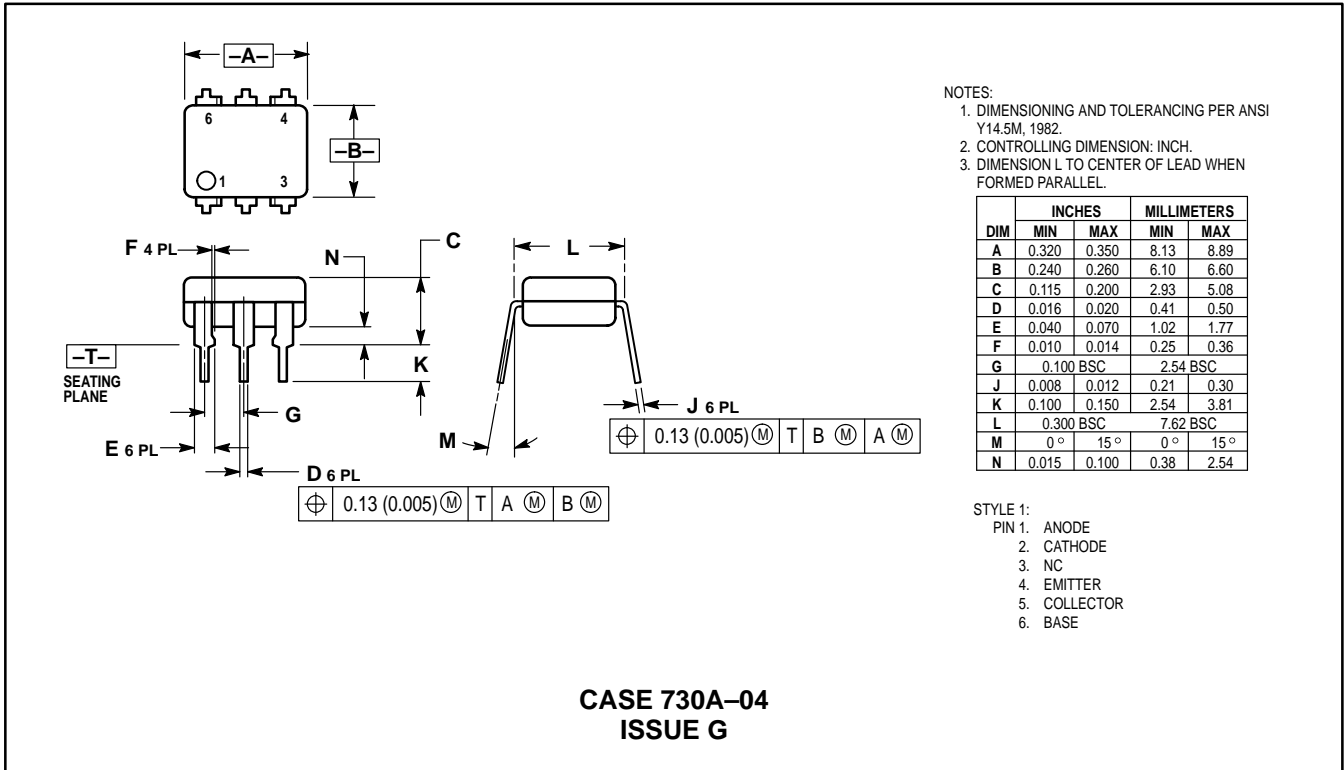


Figure 11. Switching Time Test Circuit and Waveforms

PACKAGE DIMENSIONS



# CNY17-1 CNY17-2 CNY17-3



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.320	0.350	8.13	8.89
B	0.240	0.260	6.10	6.60
C	0.115	0.200	2.93	5.08
D	0.016	0.020	0.41	0.50
E	0.040	0.070	1.02	1.77
F	0.010	0.014	0.25	0.36
G	0.100 BSC		2.54 BSC	
J	0.008	0.012	0.21	0.30
K	0.100	0.150	2.54	3.81
L	0.400	0.425	10.16	10.80
N	0.015	0.040	0.38	1.02

**\*Consult factory for leadform option availability**

**CASE 730D-05  
ISSUE D**

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