



# THE DATASHEET OF TPC816A C9G



## 200mW, 4 PIN DIP Phototransistor Photocoupler

### FEATURES

- Current transfer ratio  
(CTR: MIN.80% at  $I_F=5mA$ ,  $V_{CE}=5V$ )
- High isolation voltage between input and output  
( $V_{iso}=5000V$  rms)
- High collector-emitter voltage ( $V_{CEO}:70V$ )
- Compliant to RoHS directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

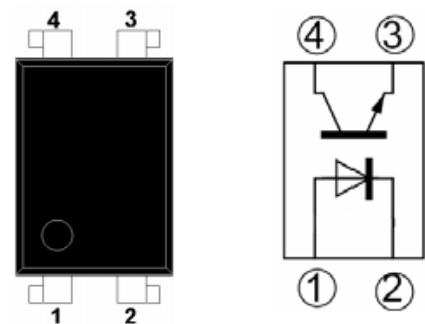
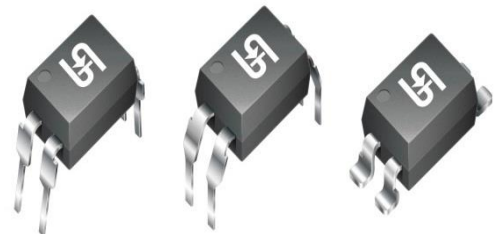
### APPLICATIONS

- Programmable controllers
- System appliances, measuring instruments
- Signal transmission between circuits of different potentials and impedances

### MECHANICAL DATA

- Case: DIP-4 , DIP-4M , SOP-4
- Molding compound: UL flammability classification rating 94V-0
- Moisture sensitivity level: level 1, per J-STD-020
- Packing code with suffix "G" means green compound (halogen-free)
- Terminal: Matte tin plated leads, solderable per J-STD-002
- Meet JESD 201 class 1A whisker test
- Polarity: Indicated by cathode band

KEY PARAMETERS		
PARAMETER	VALUE	UNIT
CTR	80-600	%
$V_{CEO}$	70	V
$P_{tot}$	200	mW
$I_C$	50	mA
$V_{iso}$	5000	Vrms
Package	DIP-4 DIP-4M SOP-4	
Configuration	Single Dice	



<b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)				
PARAMETER		SYMBOL	PART NUMBER	UNIT
Input	Forward current	$I_F$	50	mA
	Peak forward current (Note 1)	$I_{FM}$	1	A
	Reverse voltage	$V_R$	6	V
	Power dissipation	P	70	mW
Output	Collector-emitter voltage	$V_{CEO}$	70	V
	Emitter-collector voltage	$V_{ECO}$	6	V
	Collector current	$I_C$	50	mA
	Collector power dissipation	$P_C$	150	mW
Total power dissipation		$P_{tot}$	200	mW
Isolation voltage (Note 2)		$V_{iso}$	5000	Vrms
Operating temperature		$T_{opr}$	-30 to +100	$^\circ\text{C}$
Storage temperature		$T_{stg}$	-55 to +125	$^\circ\text{C}$
Soldering temperature (Note 3)		$T_{sol}$	260	$^\circ\text{C}$

**Notes:**

1. Pulse width  $\leq 100\text{ms}$  , Duty ratio : 0.001
2. 40 to 60% RH , AC for 1 minute
3. For 10s

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)							
PARAMETER		CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Input	Forward voltage	$I_F=20\text{mA}$	$V_F$		1.2	1.4	V
	Peak forward voltage	$I_{FM}=0.5\text{A}$	$V_{FM}$			3.0	V
	Reverse current	$V_R=4\text{V}$	$I_R$			10	$\mu\text{A}$
	Terminal capacitance	$V=0, f=1\text{kHz}$	$C_t$		30	250	pF
Output	Collector dark current	$V_{CE}=20\text{V}, I_F=0$	$I_{CEO}$			$10^{-7}$	A
Transfer Characteristics	Current transfer ration (Note 1)	$I_F=5\text{mA}, V_{CE}=5\text{V}$	CTR	80		600	%
	Collector-emitter saturation voltage	$I_F=20\text{mA}, I_C=1\text{mA}$	$V_{CE(sat)}$		0.1	0.2	V
	Isolation resistance	DC500V, 40 to 60%RH	$R_{ISO}$	$5 \times 10^{10}$	$10^{11}$		$\Omega$
	Floating capacitance	$V=0, f=1\text{MHz}$	$C_f$		0.6	1.0	pF
	Cut-off frequency	$V_{CE}=5\text{V}, I_C=2\text{mA},$ $R_L=100\Omega, -3\text{dB}$	$f_c$		80		KHz
	Response time	Rise time	$V_{CE}=2\text{V}, I_C=2\text{mA},$ $R_L=100\Omega$	$t_r$		4	18
Fall time			$t_f$		3	18	$\mu\text{s}$

**Notes:**

1. Classification table of current transfer ratio is shown below

**RANK TABLE OF CURRENT TRANSFER RATIO, CTR**

RANK MARK	MIN (%)	MAX (%)
A	80	160
B	130	260
C	200	400
D	300	600

ORDERING INFORMATION				
PART NO. (Note 1&2)	PACKING CODE	PACKING CODE SUFFIX	PACKAGE	PACKING
TPC816x	C9	G	DIP-4	100 / TUBE
TPC816Mx	C9		DIP-4M (Leads with 0.4" spacing)	100 / TUBE
TPC816S1x	RA		SOP-4	2K / 13" Reel

**Notes:**

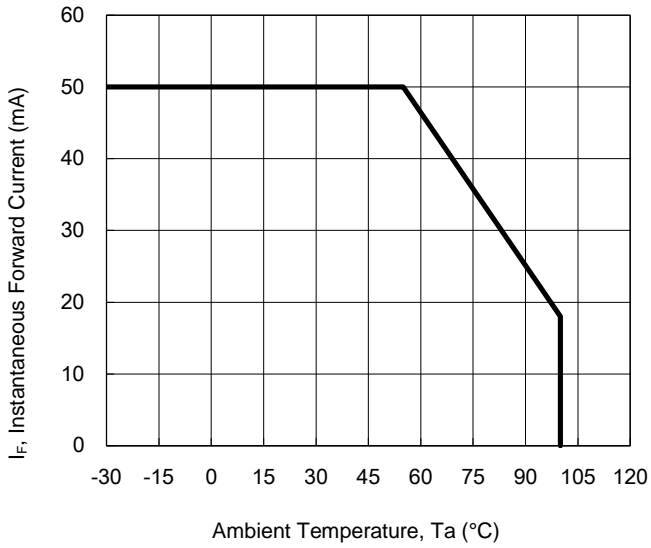
1. "x" defines CTR rank from "A" to "D"
2. Whole series with green compound

EXAMPLE				
EXAMPLE P/N	PART NO.	PACKING CODE	PACKING CODE SUFFIX	DESCRIPTION
TPC816A C9G	TPC816A	C9	G	Green compound

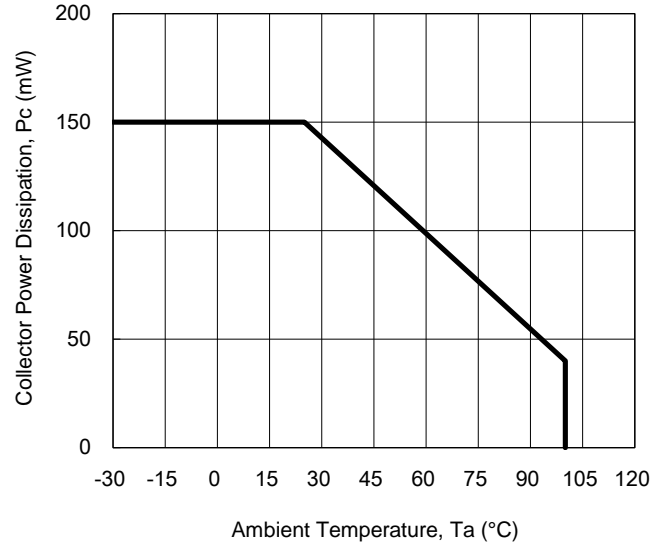
**CHARACTERISTICS CURVES**

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

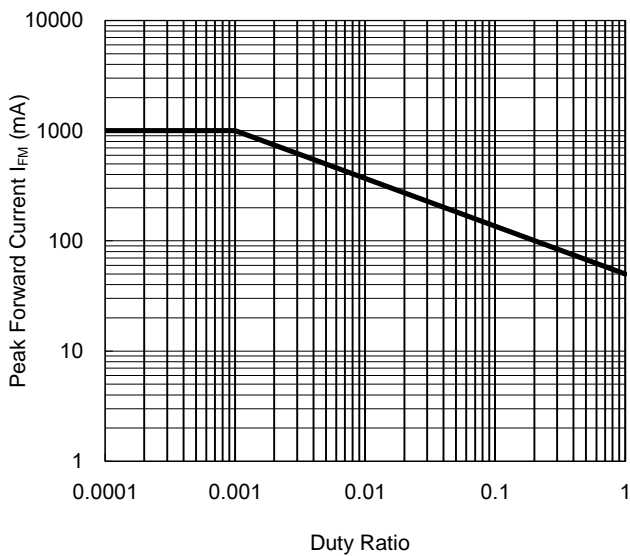
**Fig. 1 Forward Current vs. Ambient Temperature**



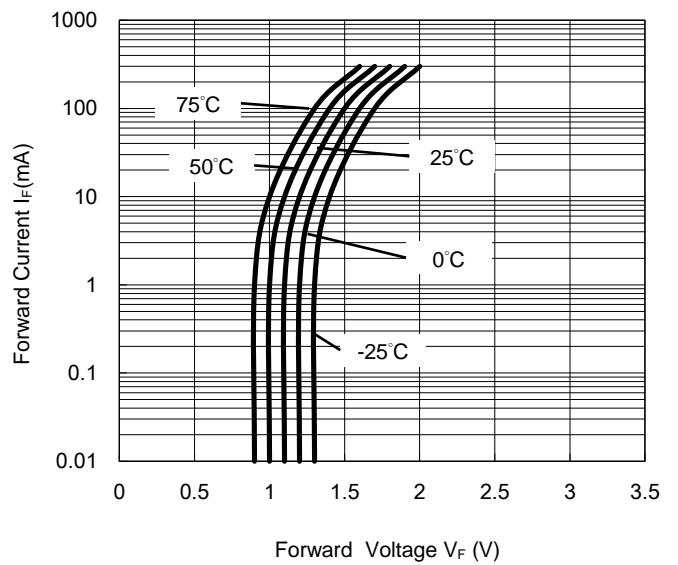
**Fig.2 Collector Power Dissipation vs. Ambient Temperature**



**Fig.3 Peak Forward Current vs. Duty Ratio**



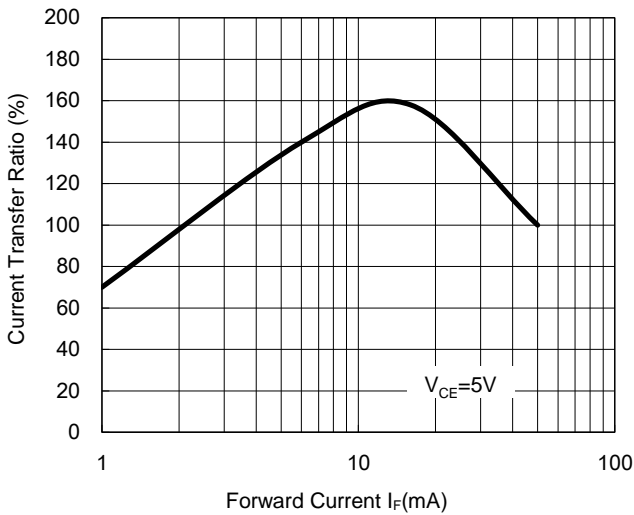
**Fig.4 Forward Current vs. Forward Voltage**



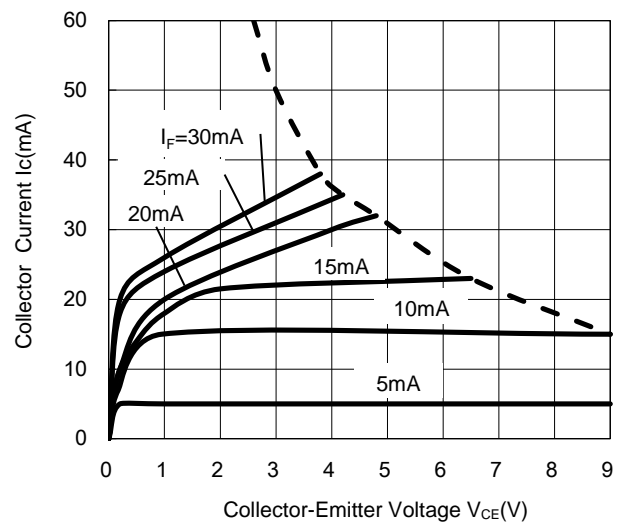
**CHARACTERISTICS CURVES**

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

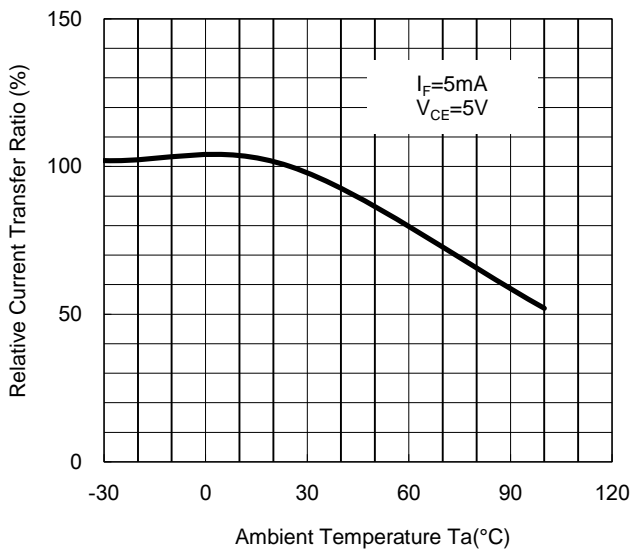
**Fig. 5 Current Transfer Ratio vs. Forward Current**



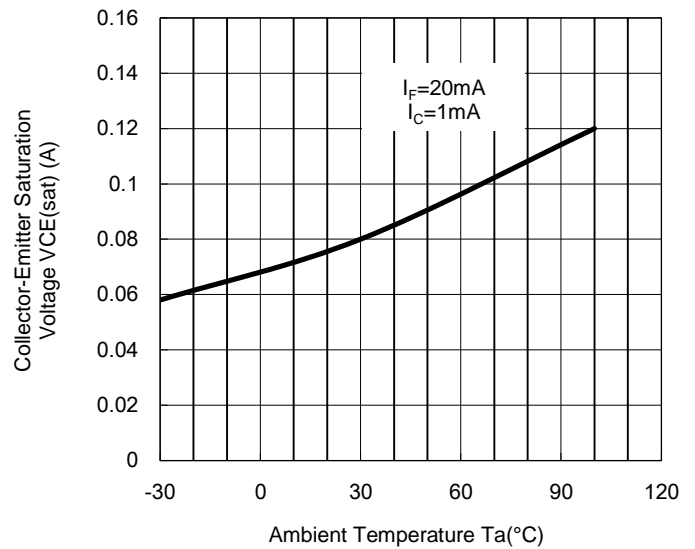
**Fig. 6 Collector Current vs. Collector-Emitter Voltage**



**Fig. 7 Relative Current Transfer Ratio vs. Ambient Temperature**



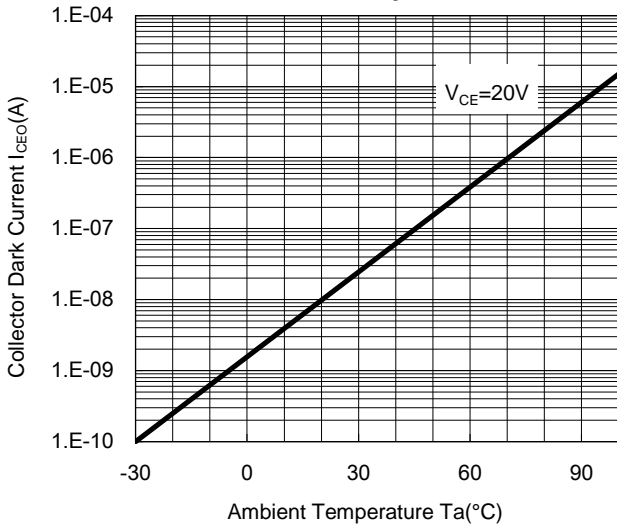
**Fig. 8 Collector-emitter Saturation Voltage vs Ambient Temperature**



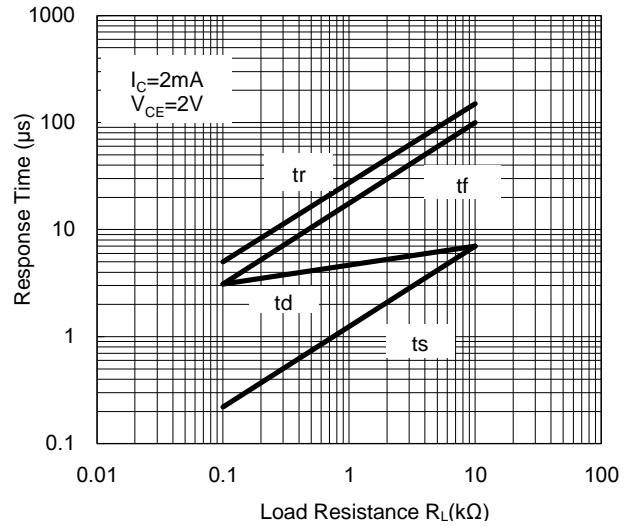
**CHARACTERISTICS CURVES**

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

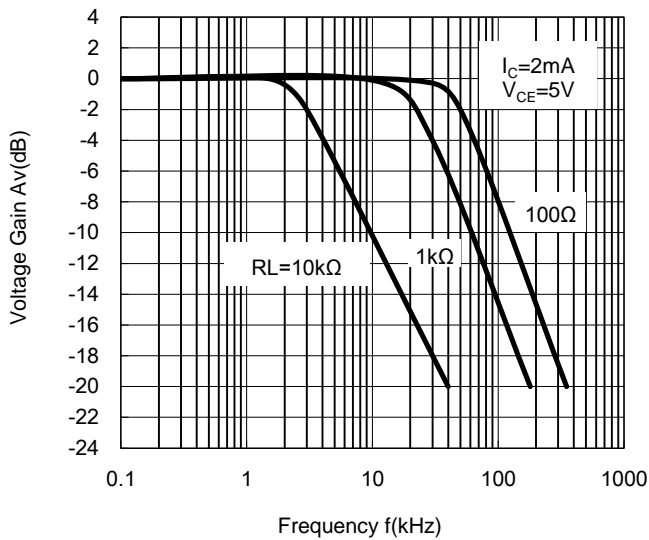
**Fig. 9 Collector Dark Current vs. Ambient Temperature**



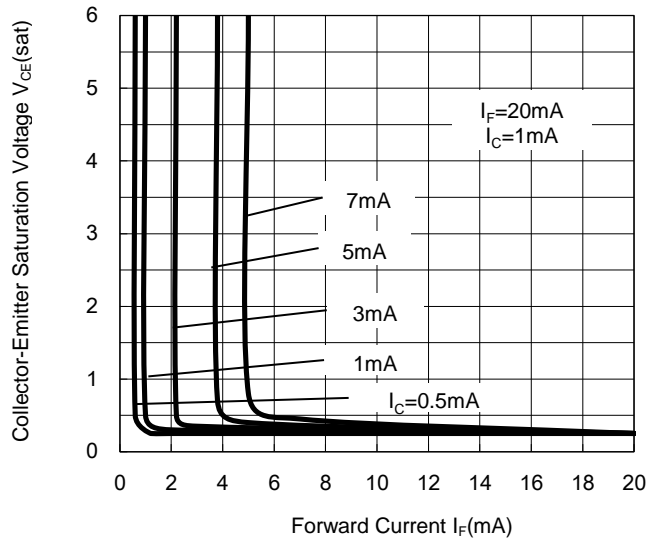
**Fig.10 Response Time vs. Load Resistance**



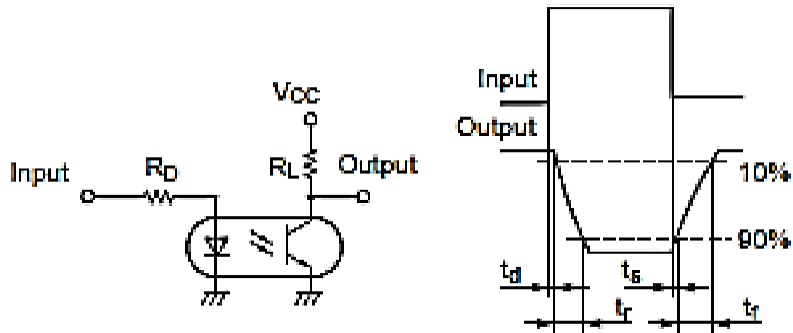
**Fig.11 Frequency Response**



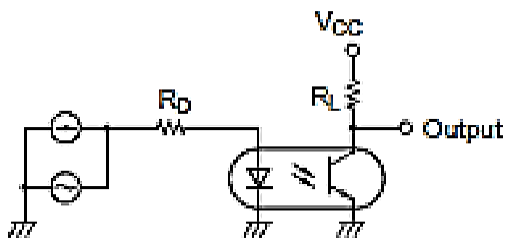
**Fig.12 Collector-Emitter Saturation Voltage vs Forward Current**



**TEST CIRCUIT RESPONSE TIME**

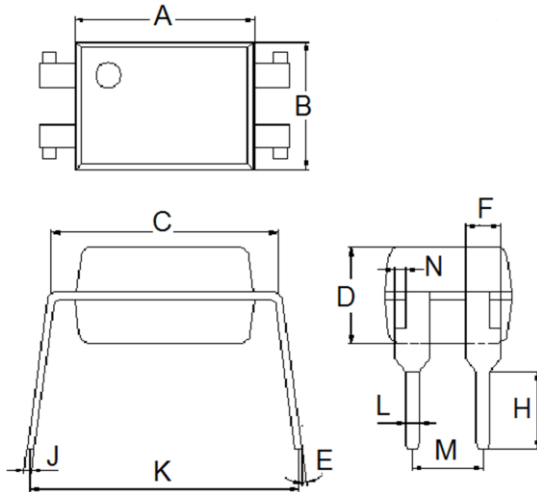


**TEST CIRCUIT FOR FREQUENCY RESPONSE**



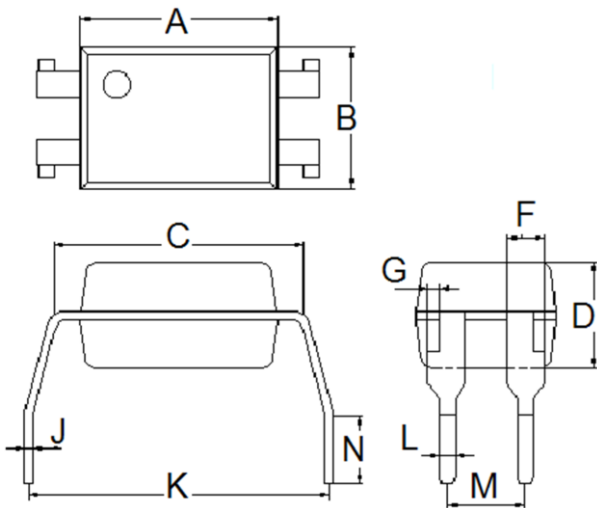
**PACKAGE OUTLINE DIMENSION**

DIP-4



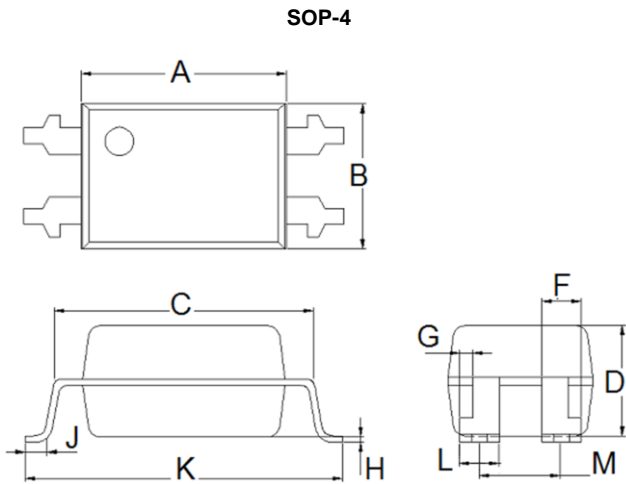
DIM.	Unit(mm)	
	Min	Max
A	6.40	6.60
B	4.50	4.70
C	7.90	8.30
D	3.28	3.68
E	2°	8°
F	1.25 typ.	
H	2.70	2.90
J	0.23	0.26
K	8.86	9.31
L	0.50 typ.	
M	2.44	2.64
N	0.40 typ.	

DIP-4M (Leads with 0.4" spacing)



DIM.	Unit(mm)	
	Min	Max
A	6.40	6.60
B	4.50	4.70
C	7.90	8.30
D	3.28	3.68
F	1.25 typ.	
G	0.40 typ.	
J	0.23	0.26
K	9.86	10.46
L	0.50 typ.	
M	2.44	2.64
N	2.40	2.90

**PACKAGE OUTLINE DIMENSION**



DIM.	Unit(mm)	
	Min	Max
A	6.40	6.60
B	4.50	4.70
C	7.90	8.30
D	3.28	3.68
F	1.25 typ.	
G	0.40 typ.	
H	0.00	0.20
J	0.90	1.20
K	9.80	10.30
L	1.25 typ.	
M	2.49	2.69

**MARKING**



**Notes :**

- 816: Product type
- B: CTR rank mark
- YWW: Date code

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