

200mW, 4 PIN DIP Phototransistor Photocoupler

FEATURES

- Current transfer ratio
(CTR: MIN.80% at $I_F=5\text{mA}$, $V_{CE}=5\text{V}$)
- High isolation voltage between input and output
(Viso=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

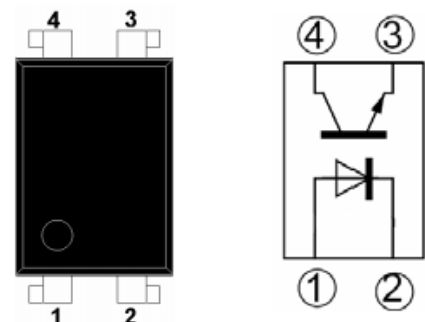
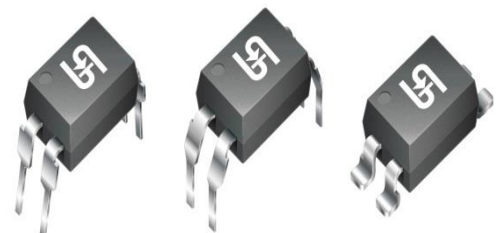
APPLICATIONS

- 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	



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ 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

ELECTRICAL SPECIFICATIONS ($T_A = 25^\circ\text{C}$ 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	μA
	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}	5×10^{10}	10^{11}		Ω
	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	$V_{CE}=2\text{V}, I_C=2\text{mA}, R_L=100\Omega$	Rise time		4	18	μs
			Fall time		3	18	μs

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

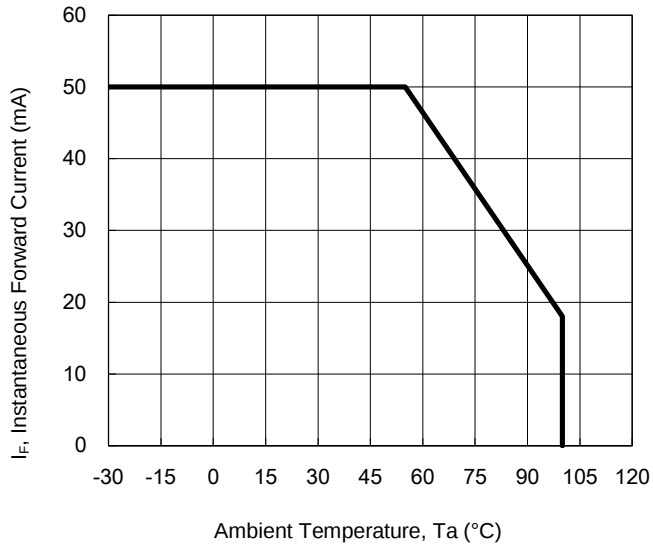


Fig.2 Collector Power Dissipation vs. Ambient Temperature

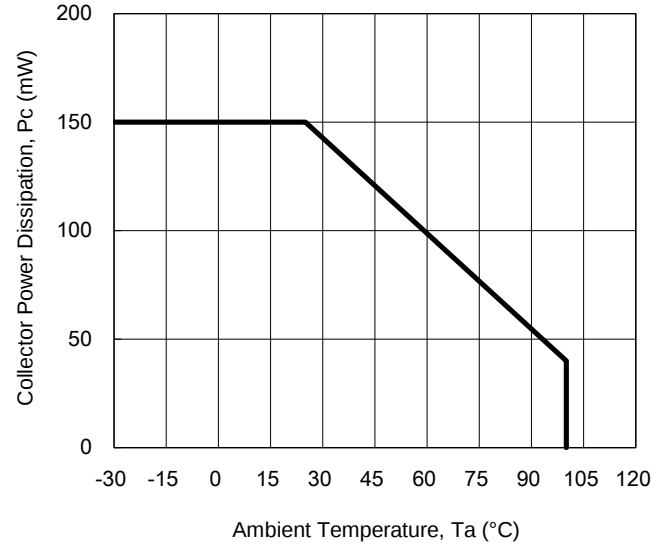


Fig.3 Peak Forward Current vs. Duty Ratio

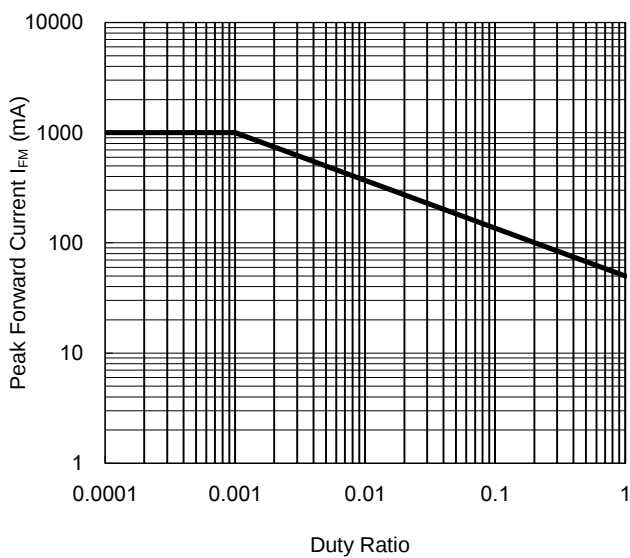
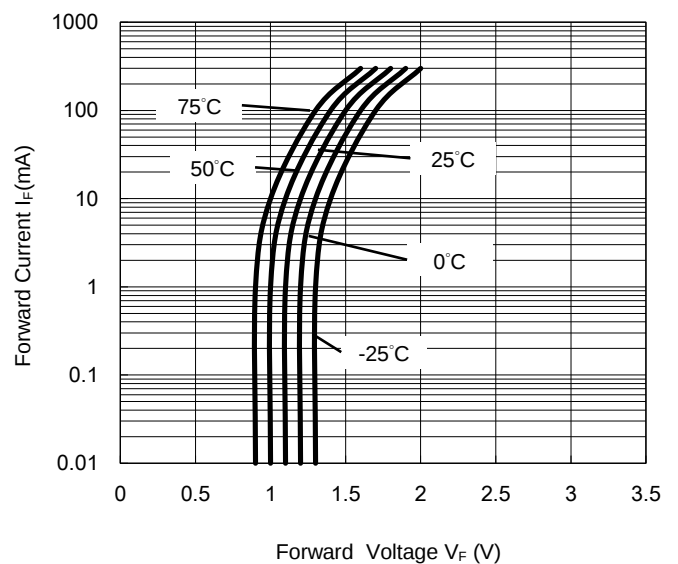


Fig.4 Forward Current vs. Forward Voltage



CHARACTERISTICS CURVES

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

Fig. 5 Current Transfer Ratio vs. Forward Current

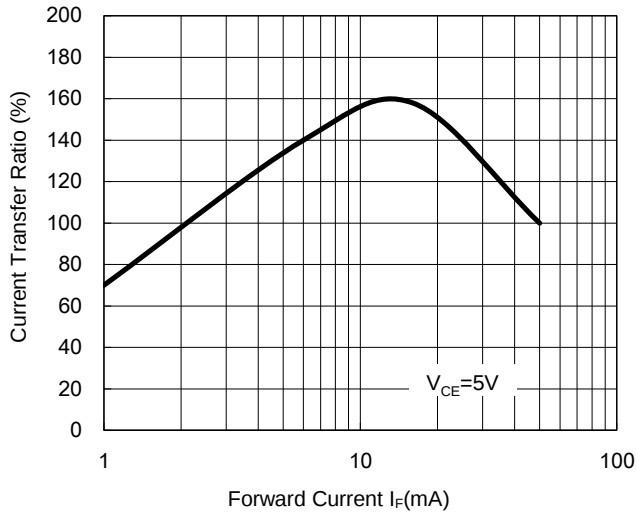


Fig. 6 Collector Current vs. Collector-Emitter Voltage

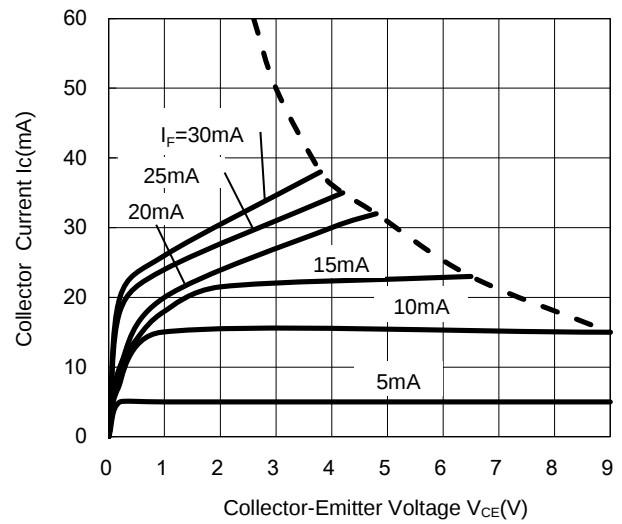


Fig. 7 Relative Current Transfer Ratio vs. Ambient Temperature

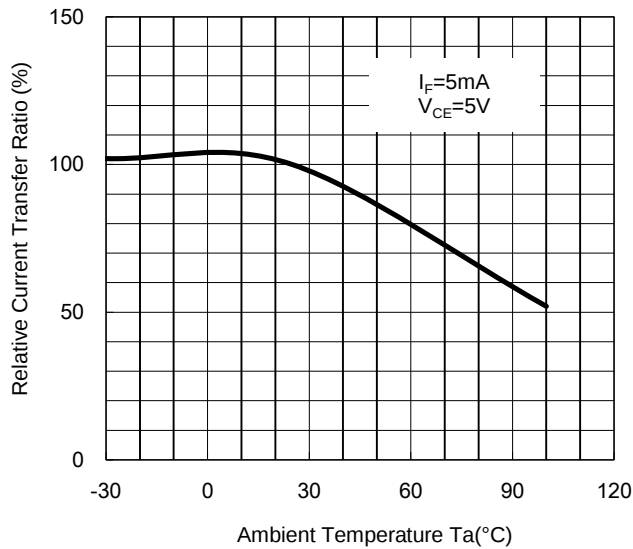
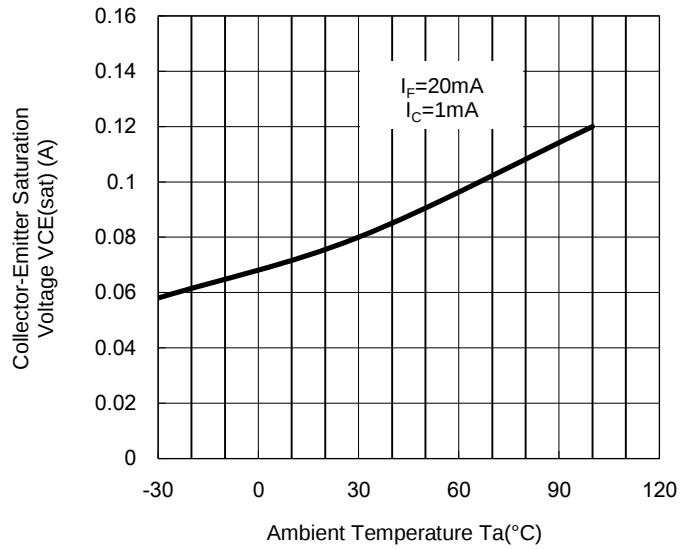


Fig. 8 Collector-emitter Saturation Voltage vs. Ambient Temperature



CHARACTERISTICS CURVES

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

Fig. 9 Collector Dark Current vs. Ambient Temperature

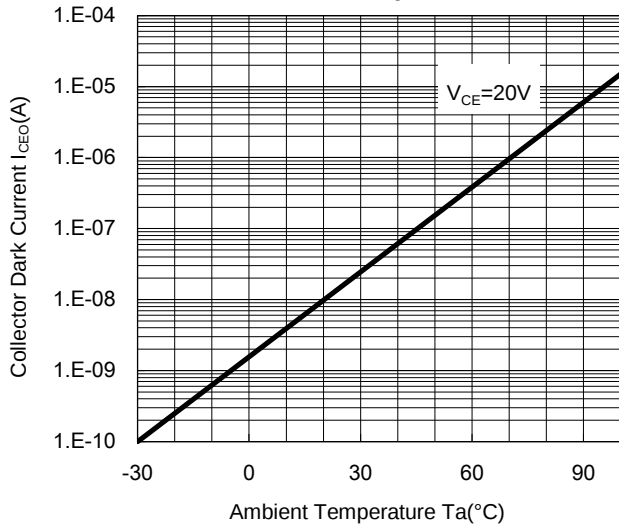


Fig.10 Response Time vs. Load Resistance

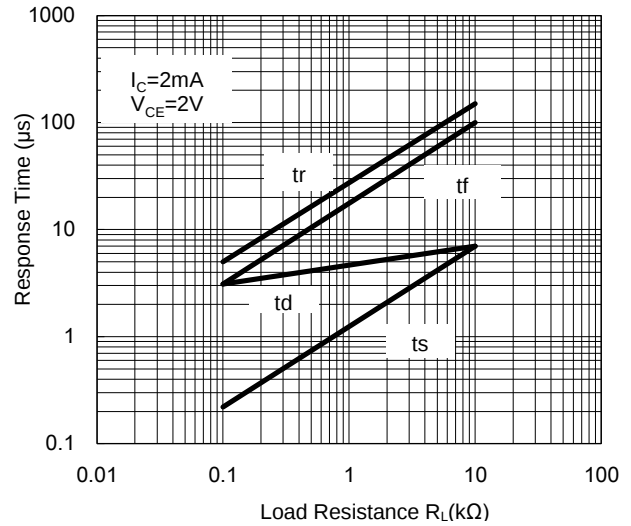


Fig.11 Frequency Response

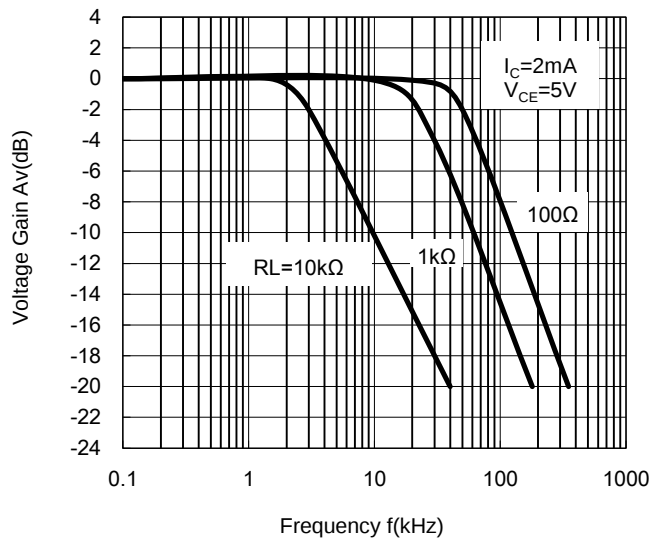
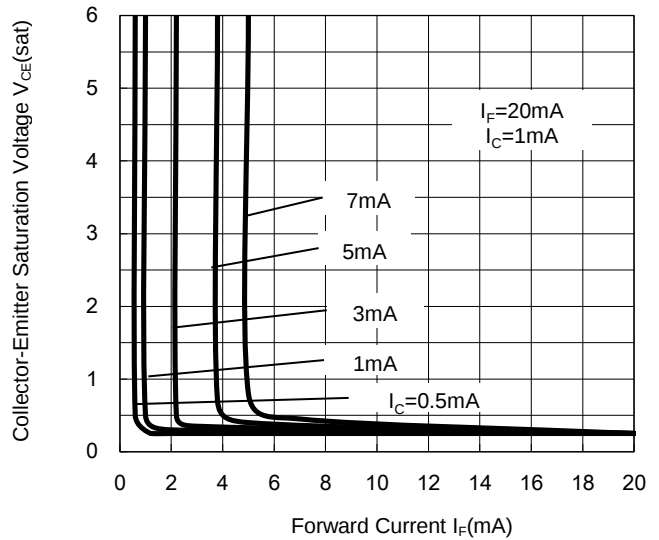
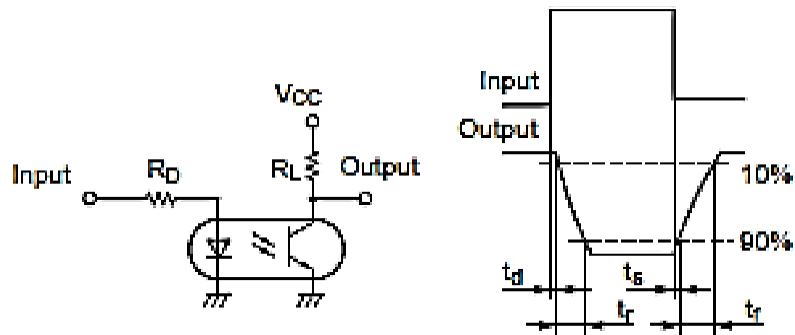


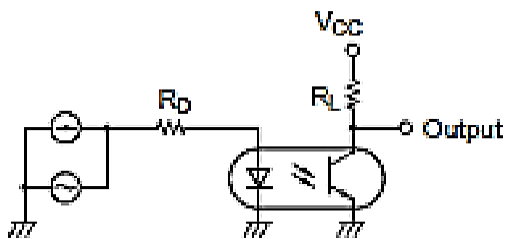
Fig.12 Collector-Emitter Saturation Voltage vs Forward Current



TEST CIRCUIT RESPONSE TIME

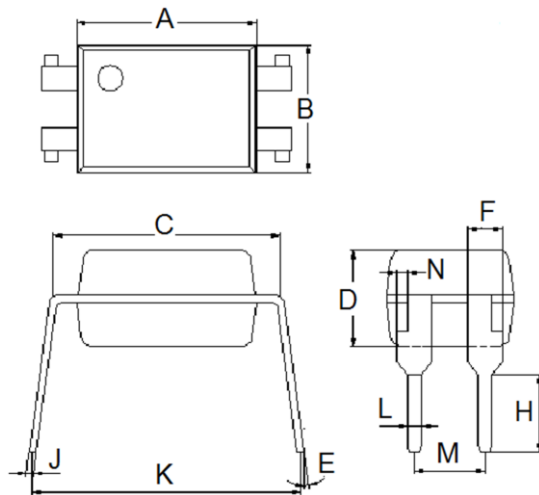


TEST CIRCUIT FOR FREQUENCY RESPONSE



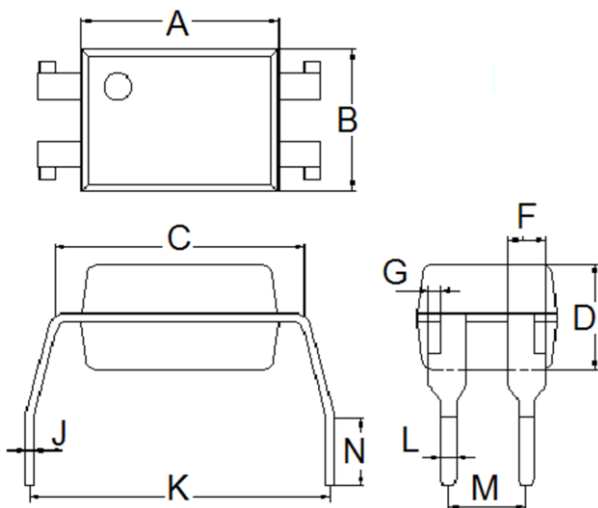
PACKAGE OUTLINE DIMENSION

DIP-4



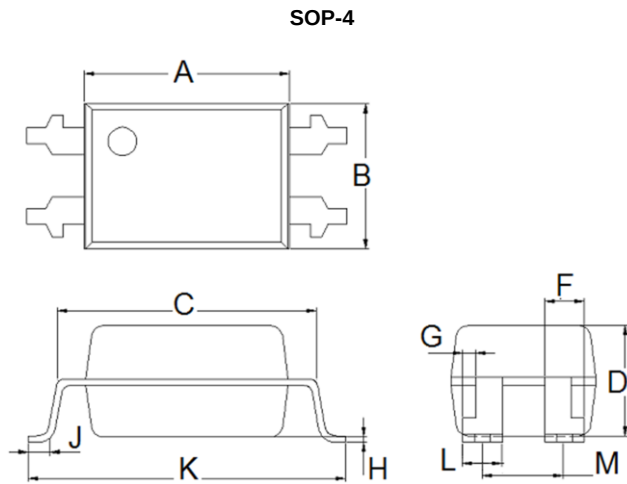
DIM.	Unit(mm)	
	Min	Max
A	6.40	6.60
B	4.50	4.70
C	7.90	8.30
D	3.28	3.68
E	2°	8°
F	1.25 typ.	
H	2.70	2.90
J	0.23	0.26
K	8.86	9.31
L	0.50 typ.	
M	2.44	2.64
N	0.40 typ.	

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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