

RS-232D LINE DRIVER/RECEIVER

DESCRIPTION

The μ PD4712A, 4712B are silicon gate CMOS ICs which combine 4 sets of line drivers and receivers conforming to the RS-232D standard. A single +5 V power source operation is realized by built-in DC-DC converter. Moreover, the attractive additional functions are provided such as driver output control function, receiver input threshold hysteresis select function and standby function etc.

By these features, the μ PD4712A, 4712B are the best choice for DTE (Data Terminal Equipment), DCE (Data Circuit Terminating Equipment) and OA equipment.

FEATURES

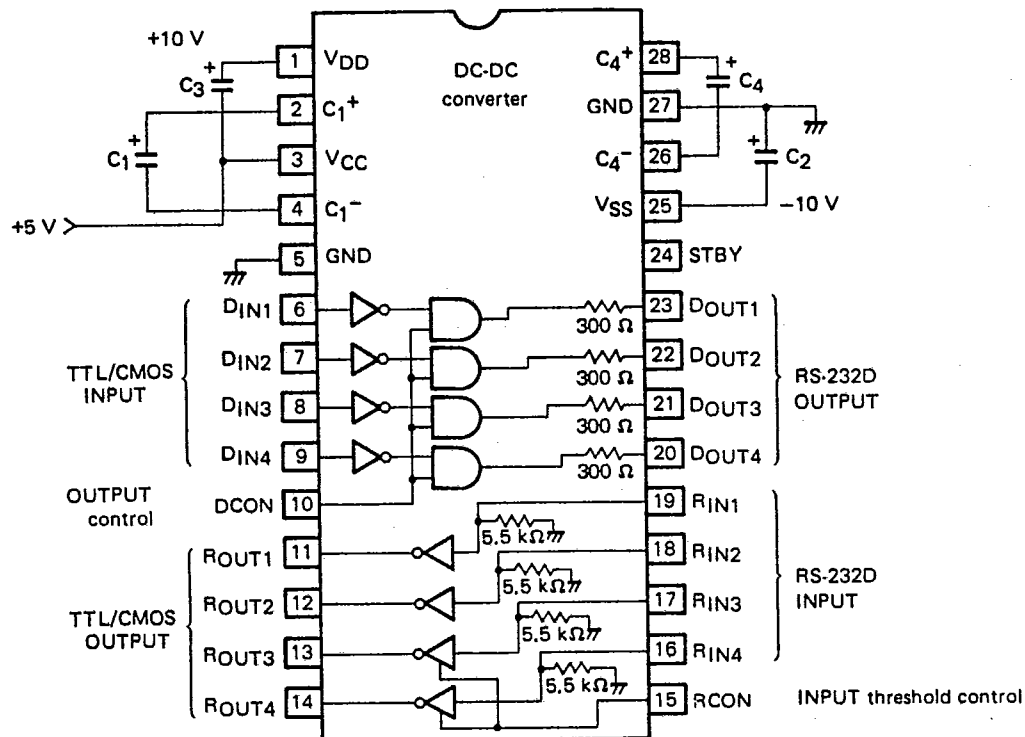
- Conforms to EIA RS-232D standard
- Operates on a single +5 V power source
- Provided power-ON reset function
- Provided power-OFF driver output OFF hold function
- Two types of receiver input threshold hysteresis are selectable
- μ PD4712A: TYPE A $V_{IH} = 2.2$ V TYP., $V_{IL} = 1$ V TYP.
TYPE B $V_{IH} = 2.2$ V TYP., $V_{IL} = -1.8$ V TYP.
- μ PD4712B: TYPE A $V_{IH} = 2.2$ V TYP., $V_{IL} = 1$ V TYP.
TYPE C $V_{IH} = -0.8$ V TYP., $V_{IL} = -2$ V TYP.
- Standby function
- Latch-up free

ORDERING INFORMATION

Part Number	Package
μ PD4712ACY	28 Pin Plastic DIP (400 mil)
μ PD4712AGT	28 Pin Plastic SOP (375 mil)
μ PD4712BCY	28 Pin Plastic DIP (400 mil)
μ PD4712BGT	28 Pin Plastic SOP (375 mil)

The information in this document is subject to change without notice.

BLOCK DIAGRAM/CONNECTION DIAGRAM (Top View)



* STBY terminal is pulled down to ground by internal resistor.

TRUTH TABLE

STBY	DCON	D _{IN}	D _{OUT}	
H	X	X	Z	Stand-by mode
L	L	X	L	Output "mark level"
L	H	L	H	Output "space level"
L	H	H	L	Output "mark level"

STBY	R _{IN}	R _{OUT}
H	X	Z
L	H	L
L	L	H

H: High Level, L: Low Level, Z: High Impedance

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

Supply Voltage	V_{CC}	-0.5 to +6.0	V
Driver Input Voltage	D_{IN}	-0.5 to $V_{CC} + 0.5$	V
Receiver Input Voltage	R_{IN}	-30.0 to +30.0	V
Driver Output Voltage	D_{OUT}	-25.0 to +25.0 Note 1	V
Receiver Output Voltage	R_{OUT}	-0.5 to $V_{CC} + 0.5$	V
Input Current	I_{IN}	± 60.0	mA
Operating Temperature Range	T_{opt}	-40 to +85	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	$^\circ\text{C}$
Power Dissipation	P_T	0.5	W

Note 1 Pulse width 1 ms, duty 10 % MAX.

RECOMMENDED OPERATING CONDITION

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	V_{CC}	4.5	5.0	5.5	V
Operating Temperature Range	T_{opt}	-20		80	$^\circ\text{C}$
External Capacitor Note 2		22		47	μF

Note 2 The electrolytic capacitor's capacitance goes smaller, when ambient temperature is below 0°C . Take the lowest operating temperature into account when choosing the capacitance value. Connect the external capacitor to minimize the wiring between the capacitor and the pin of μ PD4712A, 4712B.

ELECTRICAL CHARACTERISTICS (Total)

($V_{CC} = +5\text{ V} \pm 10\%$, $T_a = -20^\circ\text{C}$ to $+80^\circ\text{C}$, C_1 to $C_4 = 22\ \mu\text{F}$)

CHARACTERISTICS	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Supply Current	I_{CC1}		9.0	18.0	mA	$V_{CC}=+5\text{ V}$, $R_L=\infty$ $R_{IN}=\text{OPEN}$ $\text{STBY}=\text{OPEN}$
Supply Current	I_{CC2}		25.0	40.0	mA	$V_{CC}=+5\text{ V}$, $R_L=3\text{ k}\Omega$ (D_{OUT}) $D_{IN}=\text{GND}$, R_{IN} , $R_{OUT}=\text{OPEN}$ $\text{STBY}=\text{OPEN}$
Supply Current (stand-by)	I_{CC} (stand-by)		50	120	μA	$V_{CC}=+5\text{ V}$ $R_L=\infty$, $R_{IN}=\text{OPEN}$ $\text{STBY}=+5\text{ V}$ Note 3
Stand-by, Low Level Input Voltage	$V_{IL}(\text{STBY})$			0.8	V	
Stand-by, High Level Input Voltage	$V_{IH}(\text{STBY})$	2.0			V	
Input Capacitance	C_{IN}			10	pF	D_{IN} and R_{IN}

Note 3 When high level voltage is applied to STBY terminal, internal DC-DC converter stops and D_{OUT} , R_{OUT} terminals go to high impedance.

NEC**μPD4712A, μPD4712B****ELECTRICAL CHARACTERISTIC (Driver)**

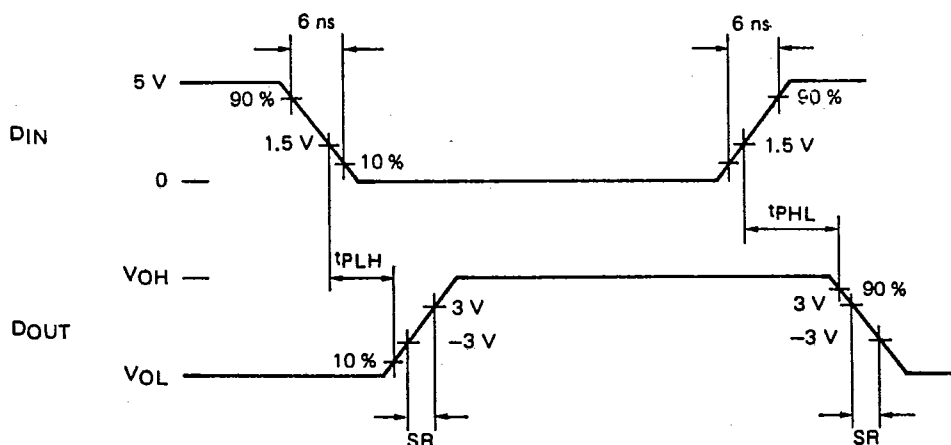
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(V_{CC} = +5 V ± 10 %, T_a = -20 °C to +80 °C, C₁ to C₄ = 22 μF)

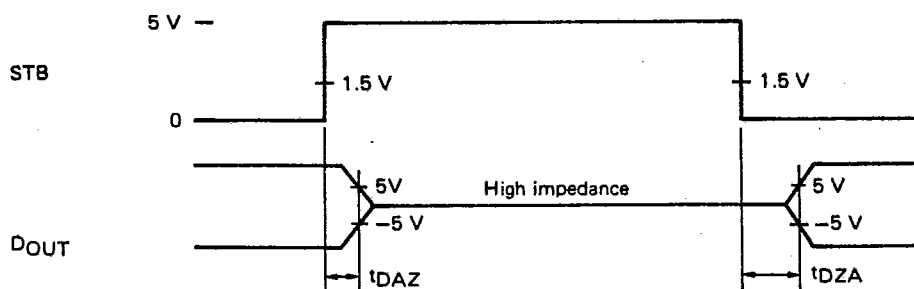
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Low Level Input Voltage	V _{IL}			0.8	V	D _{IN} , D _{CON}
High Level Input Voltage	V _{IH}	2.0			V	D _{IN} , D _{CON}
Low Level Input Current	I _{IL}	0		-1.0	μA	
High Level Input Current	I _{IH}	0		1.0	μA	
Output Voltage	V _{DO}		±9.7		V	V _{CC} =5.0 V, R _L =∞, T _a =25 °C
		±6.5	+7.7, -7.2		V	V _{CC} =5.0 V, R _L =3 kΩ, T _a =25 °C
		±5			V	V _{CC} =5.0 V, R _L =3 kΩ, T _a =T _{opt}
		±6			V	V _{CC} =4.5 V, R _L =3 kΩ, T _a =25 °C
Output Short Current	I _{SC}		±15	±40	mA	V _{CC} =5.0 V, to GND
Slew Rate Note 5	SR	1.5	4	30	V/μs	C _L =10 pF, R _L =3 to 7 kΩ
		1.5	4	30	V/μs	C _L =2 500 pF, R _L =3 to 7 kΩ
Propagation Delay Note 5	t _{PHL}		0.8		μs	R _L =3.5 kΩ, C _L =2 500 pF
	t _{PLH}				μs	
Output Resistance	R _O	300			Ω	V _{CC} =V _{DD} =V _{SS} =0 V, V _{OUT} =±2 V
Transition Time Note 6	t _{DAZ}		4	10	μs	
Transition Time Note 6	t _{DZA}		25	50	ms	

Note 4 The outputs of the four driver circuits can be fixed to the OFF (Low) status, independently of data signals, by lowering the signal level of the output control pin (D_{CON} terminal).

Note 5 Measurement Point.



Note 6 Measurement Point.



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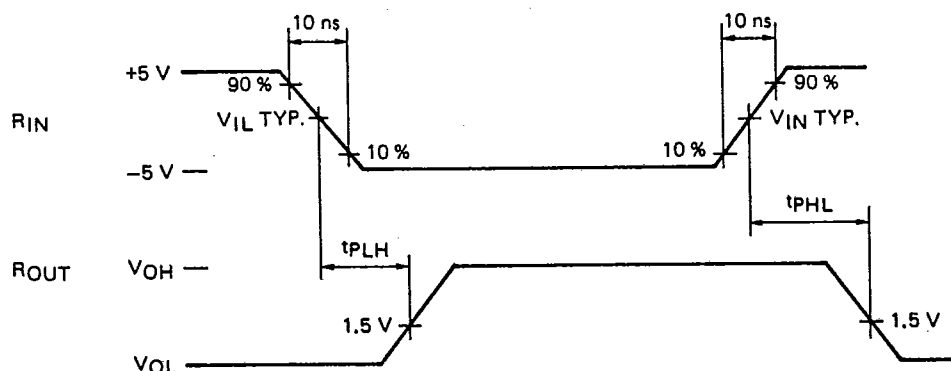
ELECTRICAL CHARACTERISTIC (Receiver)

($V_{CC} = +5 V \pm 10 \%$, $T_a = -20^\circ C$ to $+80^\circ C$, C_1 to $C_4 = 22 \mu F$)

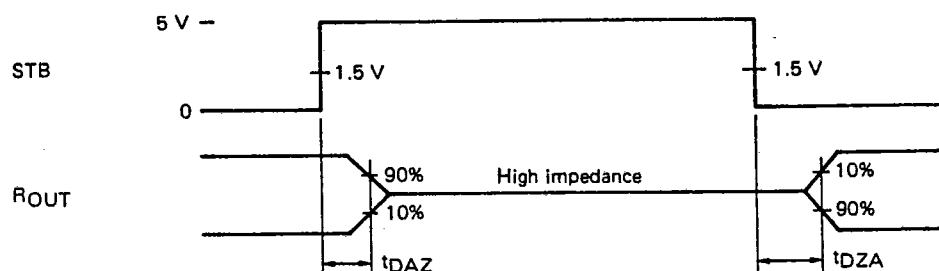
CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Low Level Output Voltage	V_{OL}			0.4	V	$I_{OUT}=4 \text{ mA}$
High Level Output Voltage	V_{OH}	$V_{CC}-0.8$			V	$I_{OUT}=-4 \text{ mA}$
Low Level Input Voltage	V_{IL}			0.8	V	R_{CON}
High Level Input Voltage	V_{IH}	2.0			V	R_{CON}
Propagation Delay Note 8	t_{PHL} t_{PLH}		0.13		μs	$R_L=1 \text{ k}\Omega$, $C_L=150 \text{ pF}$
Input Current	I_{IN}		1		mA	$V_{IN}=\pm 5 \text{ V}$
Input Resistance	R_I	3	5	7	$k\Omega$	$V_{IN}=\pm 3$ to $\pm 25 \text{ V}$
Input Voltage	V_{IN}	-30		+30	V	
Input Open Voltage	V_{IO}			0.5	V	Only Input Threshold TYPE A
Input Threshold TYPE A (R_{CON} : Low)	V_{IH}	1.6	2.2	2.6	V	$V_{CC}=+5 \text{ V}$
	V_{IL}	0.6	1	1.6	V	$V_{CC}=+5 \text{ V}$
	V_H	0.5	1.2	1.8	V	$V_{CC}=+5 \text{ V}$ (Hysteresis width)
Input Threshold TYPE B (R_{CON} : High) Note 7 μPD4712A only	V_{IH}	1.6	2.2	2.6	V	$V_{CC}=+5 \text{ V}$
	V_{IL}	-0.4	-1.8	-3.0	V	$V_{CC}=+5 \text{ V}$
	V_H	2.6	4.0	5.4	V	$V_{CC}=+5 \text{ V}$ (Hysteresis width)
Input Threshold TYPE C (R_{CON} : High) Note 7 μPD4712B only	V_{IH}	-0.4	-0.8	-1.6	V	$V_{CC}=+5 \text{ V}$
	V_{IL}	-0.8	-2.0	-3.0	V	$V_{CC}=+5 \text{ V}$
	V_H	0.5	1.2	1.8	V	$V_{CC}=+5 \text{ V}$ (Hysteresis width)
Transition Time Note 9	t_{DAZ}		0.4	1	μs	
Transition Time Note 9	t_{DZA}		0.03	10	ms	

Note 7 Applied to only receiver 3.4.

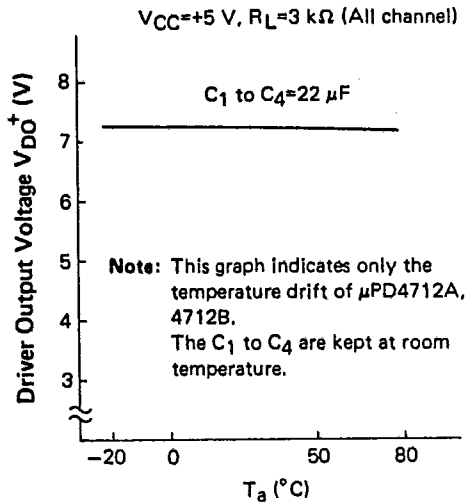
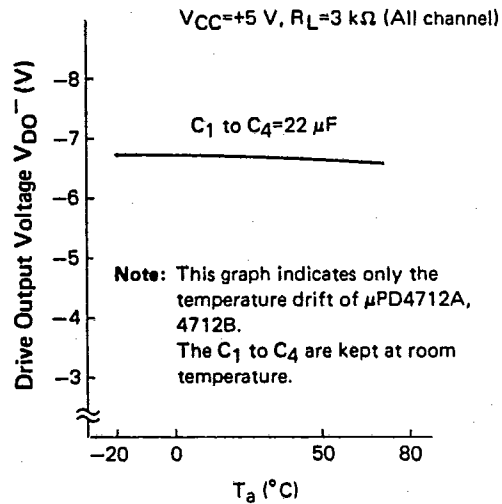
Note 8 Measurement Point.



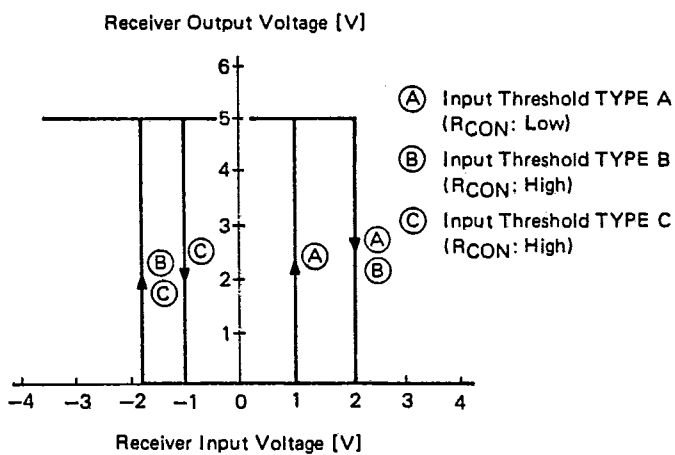
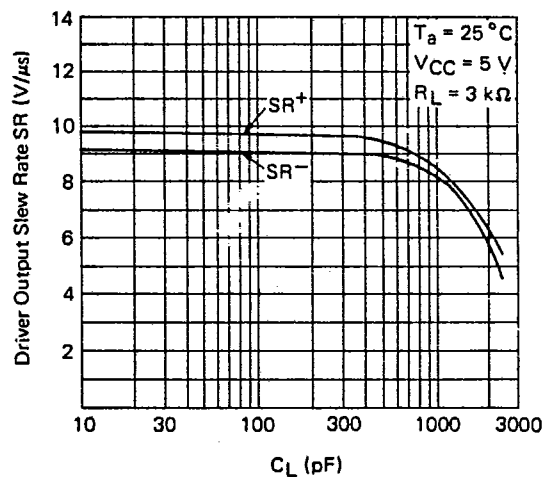
Note 9 Measurement Point



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TYPICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)Driver Output Voltage $V_{DO}^+ - T_a$ Driver Output Voltage $V_{DO}^- - T_a$ 

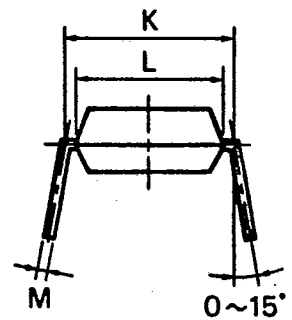
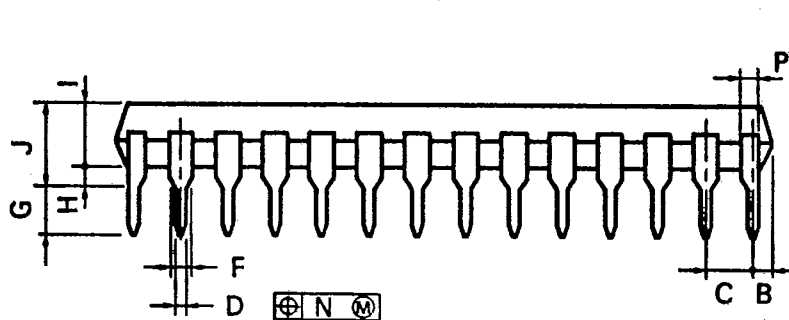
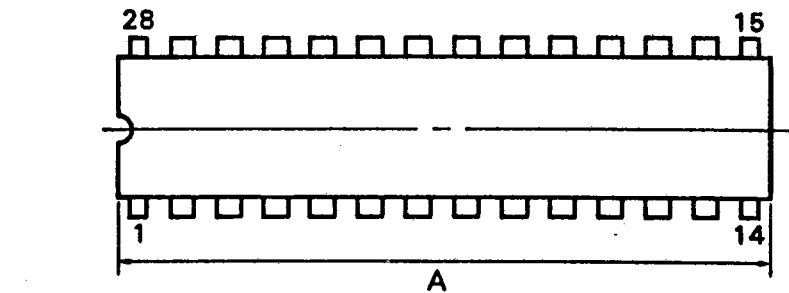
Receiver Input Hysteresis

Driver Output Slew Rate - C_L 

PACKAGE DIMENSION

28PIN PLASTIC DIP (400 mil)

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P28C-100-400

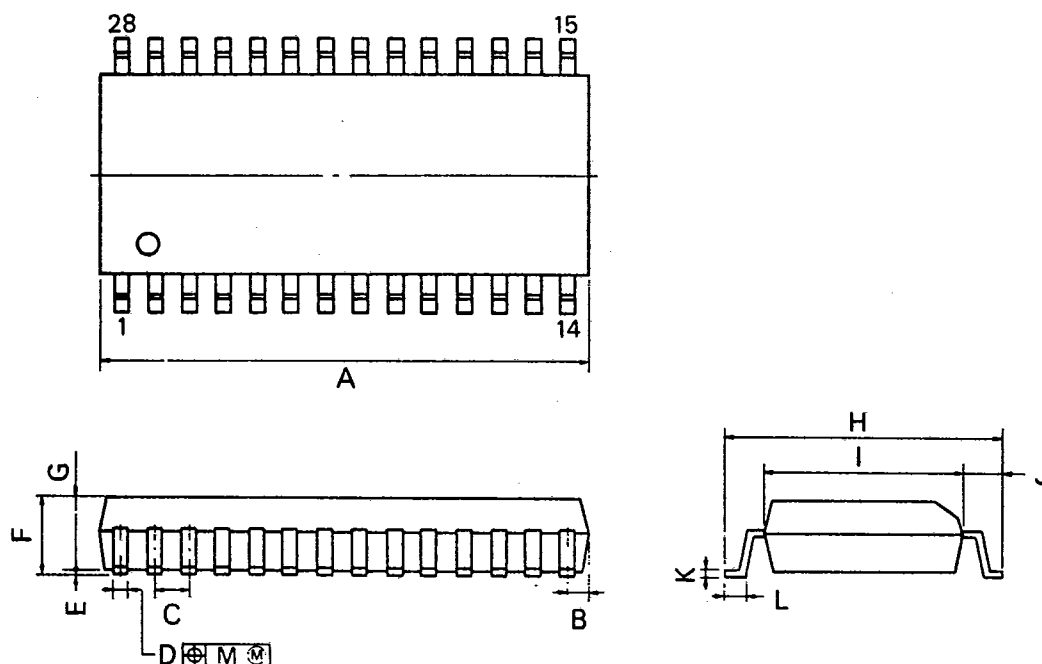
NOTES

- 1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.
- 2) Item "K" to center of leads when formed parallel.

ITEM	MILLIMETERS	INCHES
A	35.56 MAX.	1.400 MAX.
B	1.27 MAX.	0.050 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
D	0.50 ^{+0.10}	0.020 ^{+0.004} _{-0.005}
F	1.1 MIN.	0.043 MIN.
G	3.5 ^{+0.3}	0.138 ^{+0.012}
H	0.51 MIN.	0.020 MIN.
I	4.31 MAX.	0.170 MAX.
J	5.72 MAX.	0.226 MAX.
K	10.16 (T.P.)	0.400 (T.P.)
L	8.6	0.339
M	0.25 ^{+0.10} _{-0.08}	0.010 ^{+0.004} _{-0.003}
N	0.25	0.01
P	0.9 MIN.	0.035 MIN.

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28PIN PLASTIC MINI FLAT (375 mil)



P28GM-50-375B

NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	18.07 MAX.	0.712 MAX.
B	0.78 MAX.	0.031 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40 $^{+0.10}_{-0.05}$	0.016 $^{+0.004}_{-0.003}$
E	0.1 $^{+0.1}_{-0.0}$	0.004 $^{+0.004}_{-0.000}$
F	2.9 MAX.	0.115 MAX.
G	2.50	0.098
H	10.3 $^{+0.3}_{-0.0}$	0.406 $^{+0.013}_{-0.010}$
I	7.2	0.283
J	1.6	0.063
K	0.15 $^{+0.10}_{-0.05}$	0.006 $^{+0.004}_{-0.003}$
L	0.8 $^{+0.2}_{-0.0}$	0.031 $^{+0.008}_{-0.005}$
M	0.12	0.005