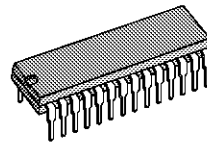


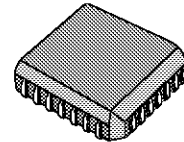
## OCTAL LINE RECEIVER

### ADVANCE DATA

- OCTAL LINE RECEIVER FOR:
  - EIA STD RS232D
  - RS423A
  - RS422A
  - CCIT V.10
  - V.11
  - V.28
  - X.26
- NO EXTERNAL COMPONENTS
- INPUT FAIL SAFING CAPABILITY
- HIGH CROSSTALK REJECTION
- L6180 DATA RATE < 100KBIT/S
- L6181 DATA RATE < 1MBIT/S
- 50V EOS OUTPUT PROTECTION



DIP 28



PLCC 28

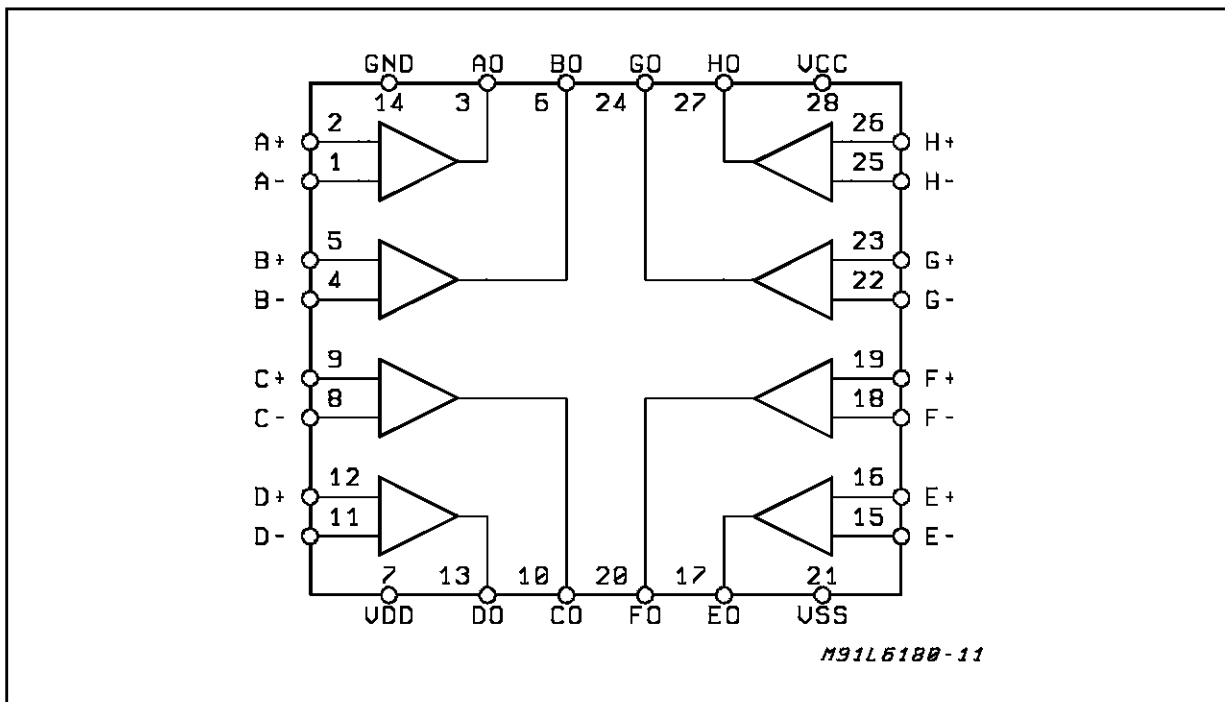
**ORDERING NUMBER:** L6180A DIP 28  
L6180D PLCC28  
L6181A DIP 28  
L6181D PLCC28

### DESCRIPTION

L6180/1 is an octal line receiver in a plastic DIP or PLCC designed to meet a wide range of digital communications requirements as outlined in the EIA standards RS232A without additional components, as well as the low speed applications of RS422A.

The receiver meets the CCIT recommendations V.10, V.11, X.26 and V.28 low speed applications (below 100KBS).  
A low pass filter on the input starts to roll off at a frequency of 100KHz.

### BLOCK DIAGRAM

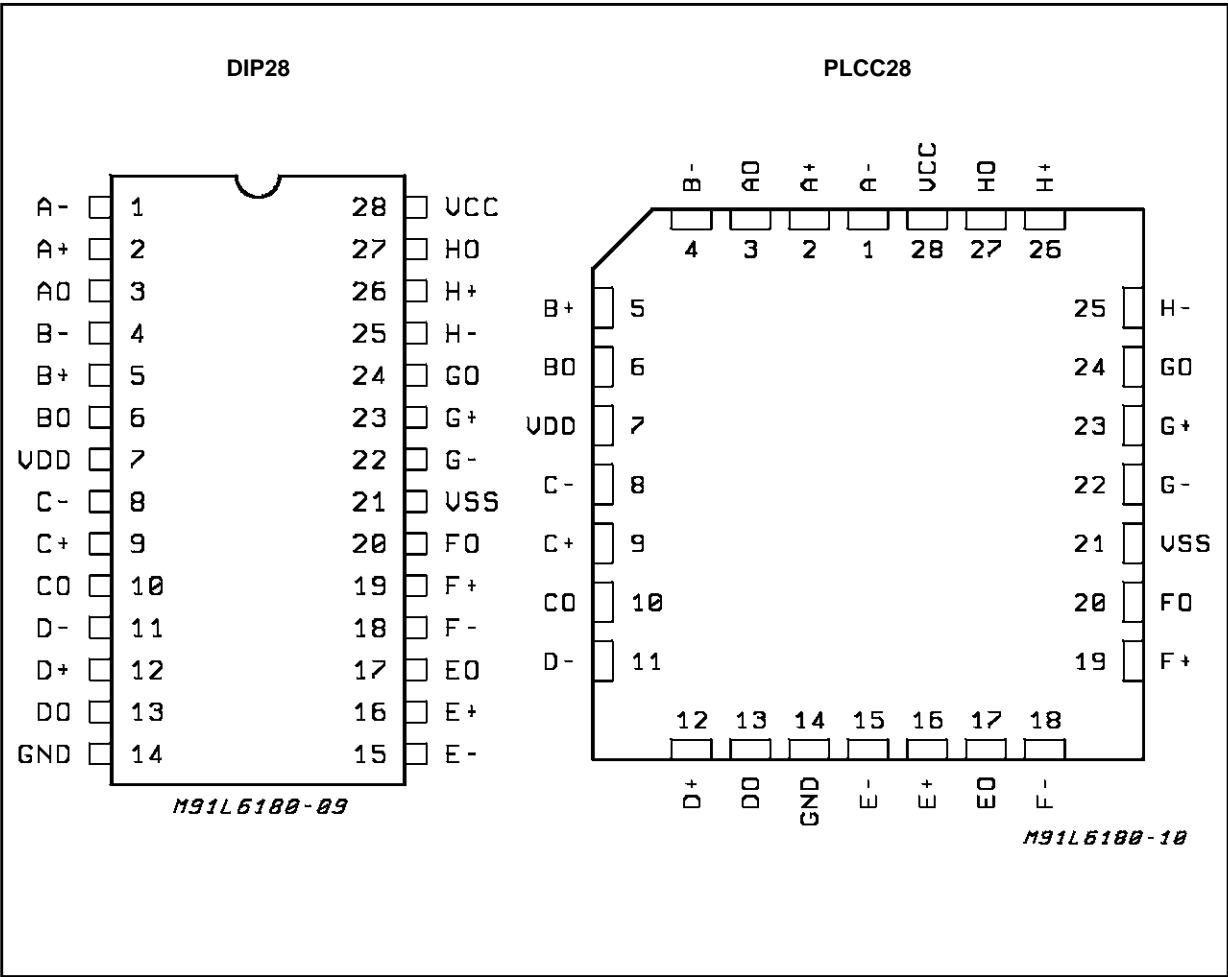


L6180 - L6181

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	7	V
V <sub>DD</sub>	Supply Voltage	13.5	V
V <sub>SS</sub>	Logic Supply Voltage	-13.5	V
C <sub>RR</sub>	Common Mode Range	±15	V
V <sub>ID</sub>	Differential Input Voltage	±25	V
P <sub>tot</sub>	Power Dissipation (PLCC 28)	800	mW
	Power Dissipation (DIP 28)	1200	mW
I <sub>OS</sub>	Output Sink Current	50	mA
t	Output Short Circuit Time	1	sec
T <sub>op</sub>	Operating Free Air Temperature Range	0 to 70	°C
T <sub>stg</sub>	Storage Temperature Range	-65 to 150	°C
	ESD	2KV max ESD 50µJ	
	Input Transient Protection	50V min EOS 100µs	

PIN CONNECTIONS (Top views)



**ELECTRICAL CHARACTERISTICS** ( $V_{CC} = 5V \pm 5\%$ ;  $V_{CM} = -7$  to  $7V$ ;  $T_{amb} = 0$  to  $70^{\circ}C$ ;  $V_{SS} = -9$  to  $13.5V$ ;  $V_{DD} = 9$  to  $13.5V$ ; unless otherwise specified.)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{IN}$	Input Current	(See Fig.1 and note2) $V_{CC} = 0$ to $5.25V$ ; $V_{SS}, V_{DD} = 0$ to $13.5V$ $V_{IN} = -10$ to $10V$ $V_{IN} = -15$ to $15V$			$\pm 3$ $\pm 4.25$	 mA mA
$R_I$	Input Resistance	$V_{IA}$ or $V_{IB} = 3$ to $15V$ ; (see fig.1) $R_I = \frac{[(V_{IA} \text{ or } V_{IN}) - V_{IOC}]}{I_{IN}}$	3		7	$K\Omega$
$V_{FS}$	Failsafe Output Voltage	$I_O = -440\mu A$ (See Fig.3)	2.7			V
$V_{OH}$	High Level Output Voltage	$V_{CC} = 4.75V$ ; $V_{ID} = -1V$ ; $I_{OH} = -440\mu A$	2.7			V
$V_{OL}$	Low Level Output Voltage	$V_{CC} = 5.25V$ ; $V_{ID} = -1V$ ; $I_{OL} = 2mA$			0.4	V
$V_{IT2}$	$V_{IOH}$ Comparator Threshold Voltage	(See Fig.4)	1.8	2.2	2.6	V
$I_{IH2}$	High Operating Threshold Voltage	$V_{OL} = 0.4V$ ; $I_{OL} = 2mA$ ; (See Fig.4)	-25		-75	mV
$I_{IH1}$	Low Operating Threshold Voltage	$V_{OH} = 2.7V$ ; $I_O = -440\mu A$ (See Fig.4)	-125		-175	mV
$V_H$	Input Hysteresis Voltage	$ V_{TH2} - V_{TH1} $	50		150	mV
$V_{IOC1}$	Open Circuit Input Voltage	Measured in accordance with V.28 and RS-232D (see note 4 and 7)		0.6	2	V
$V_{IOCH}$	Open Circuit Input Voltage	Measured in presence of AC Input Signal (see note 7)	3.5	4	4.5	V
$I_{OS}$	Open Short Circuit Current	$V_{CC} = 5.25V$ ; $V_O = 0$ ; $V_{ID} = 1V$ ; (see note 5)	20		100	mA
$V_{IBV}$	Input for Balance Test	(see Figure 7 and note 11)			0.4	V
$C_i$	Input Capacitance				100	pF
$V_{CC}$	Supply Current	$V_{CC} = 4.75V$ to $5.25V$ ; (see note 6)			100	mA
$V_{dd}$	Supply Current	$V_{dd} = 9$ to $3.5V$ ; (see note 6)			30	mA
$V_{SS}$	Supply Current	$V_{SS} = -9$ to $13.5V$ ; (see note 6)			30	mA
$I_{OS}$	Open Short Circuit Current	$V_{CC} = 5.25V$ ; $V_O = 0$ ; $V_{ID} = 1V$ ; (see note 5)	20		100	mA
$T_{plh}$	Propagation Delay Low to High	$R_L = 390\Omega$ ; $C_L = 50pF$ ; $ V_{IN}  = 1V$ ; (see fig 5 test Circuit Fig. 6)	0		1500	ns
$T_{phl}$	Propagation Delay Low to High	$R_L = 390\Omega$ ; $C_L = 50pF$ ; $ V_{IN}  = 1V$ ; (see fig 5 test Circuit Fig. 6)	0		1500	ns
$V_{IOCH}$	Delay $V_{IOCL}$ to $V_{IOCH}$ Switching	(see note 7A)			5	ms
$V_{IOCL}$	Delay $V_{IOCH}$ to $V_{IOCL}$ Switching	(see note 7B)	200			ms
$V_{ist}$	$ T_{plh} - T_{phl} $	$R_L = 390\Omega$ ; $C_L = 50pF$ ; $ V_{IN}  = 1V$ ; (see fig. 5; Test Circuit Fig. 6)	0		500	ns
$T_{SKEW1}$	Skew between rec's in PKg Tp (1) hI/1h - Tp (2) hI/1h	$R_L = 390\Omega$ ; $C_L = 50pF$ ; $ V_{IN}  = 1V$ ; (see fig. 5; Test Circuit Fig. 6)	0		300	ns
$f_A$	Frequency Accepted (Receiver will Output)	$V_{IN} = 200mV_{pp}$ ; (see fig. 8 and note 7;	100			KHz

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**ELECTRICAL CHARACTERISTICS** ( $V_{CC} = 5V \pm 5\%$ ;  $V_{CM} = -7$  to  $7V$ ;  $T_{amb} = 0$  to  $70^{\circ}C$ ;  $V_{SS} = -9$  to  $13.5V$ ;  $V_{DD} = 9$  to  $13.5V$ ; unless otherwise specified.)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$f_R$	Frequency Rejected (No Receiver Output)	$V_{IN} = 2V_{pp}$ ; (see fig. 8 and note 7)		5		MHz

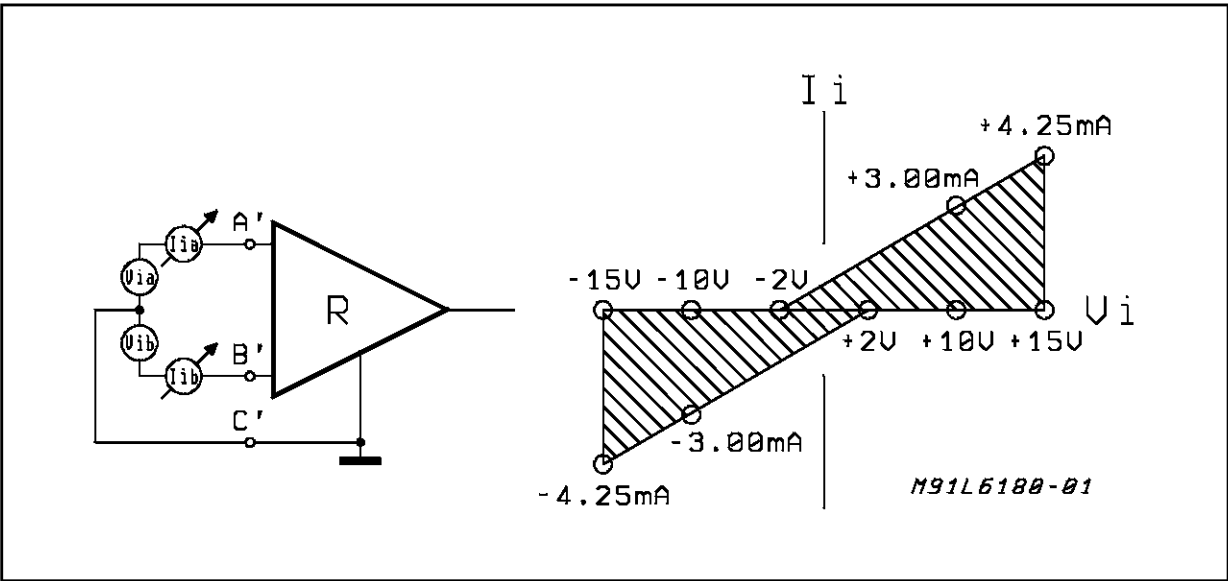
- Note:**
- 1) The algebric convention, where the less positive (more negative) is designed the minimum
  - 2) With the voltage  $V_{IA}$  or ( $V_{IB}$ ) ranging between  $\pm 15V$ , while  $V_{IB}$  or ( $V_{IA}$ ) is open or grounded, the resultant input current  $I_{IA}$  or ( $I_{IB}$ ) shall remain within the shaded region shown in the graph in Fig.1.
  - 3) Either Point B' or Point A' is grounded in Figure 1
  - 4)  $V_{ICC}$  measured from grounded to (+) input with (-) input grounded  
 $V_{ICC}$  measured from grounded to (+) input with (-) input grounded
  - 5) Not more than one output should be shorted at a time and for less than 1 second
  - 6) The sum of the product of the maximum supply currents and voltages cannot exceed the maximum power dissipation
  - 7) A: The conditions for the input switching from  $V_{IOCL}$  to  $V_{IOCH}$  mode is:  $V_{Id}$  in start bit "spacing condition" for less than  $TpV_{IOCH}$  (5ms).  
B: The conditions for the input switching from  $V_{IOCH}$  to  $V_{IOCL}$  mode is:  $V_{Id} > Ww2$  for greater than  $TpV_{IOCL}$  (200ms)
  - 8) An example of a frequency response plot meeting the rejection/acceptance requirements is provided in figure 8.

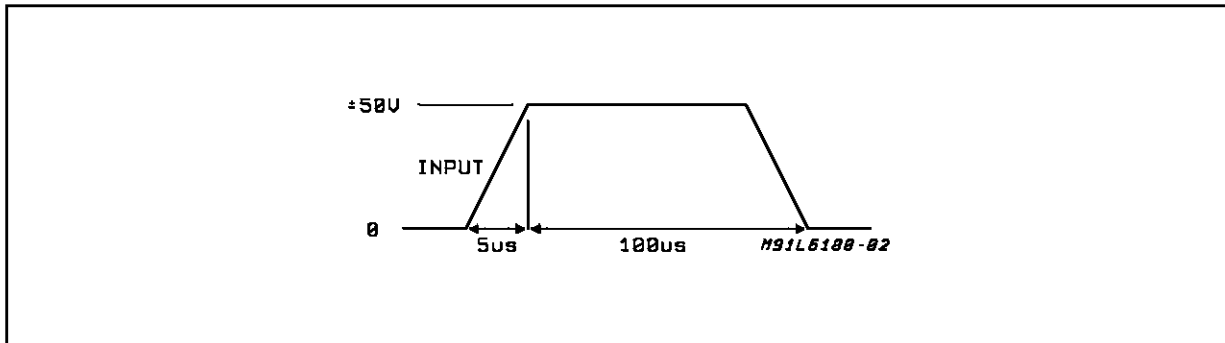
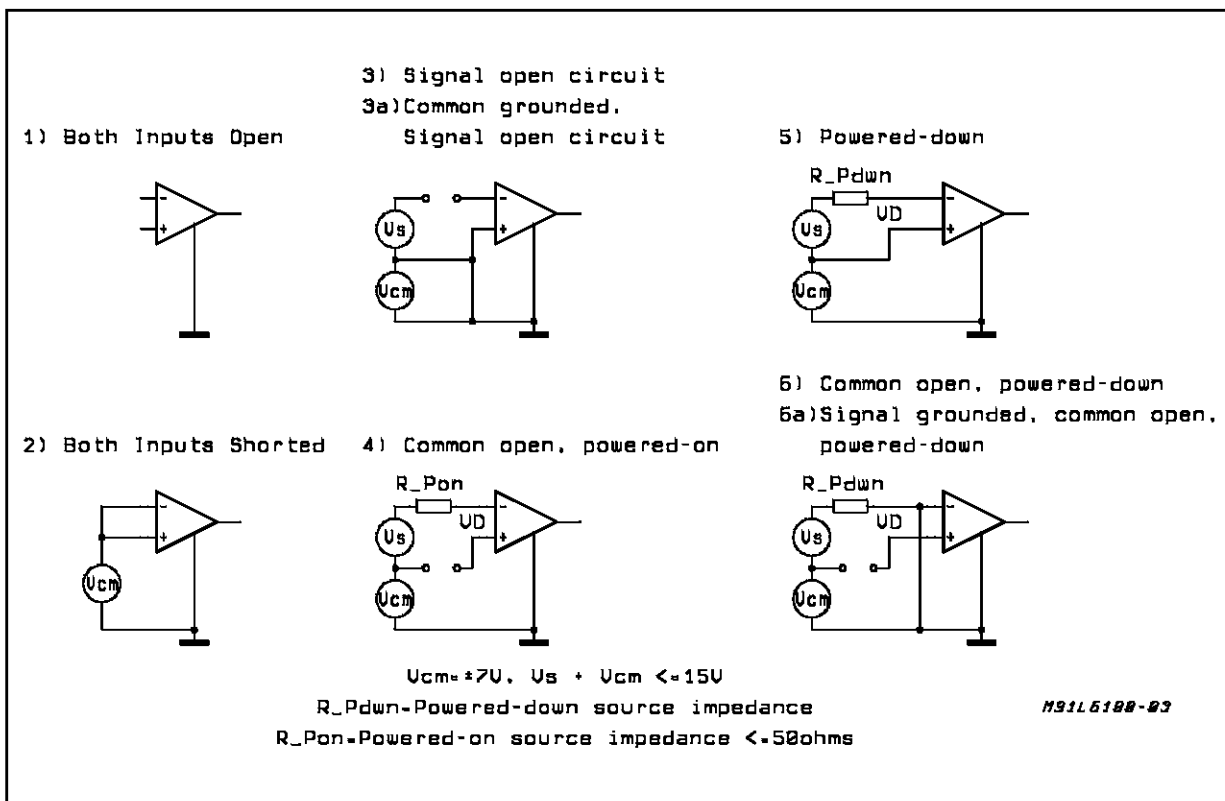
**LINE TRANSIENT IMMUNITY** (Considering the following cases; powered ON, Powered OFF-LOW impedance power supply and powered OFF-HIGH impedance supply)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
ESD	Static	tested per MIL-STD-883 (see note 9)	2			KV
EOS	Stress	transient pulse both polarities for 100 $\mu$ s (see note 9 and Fig. 2)	50			V

- Note:**
- 9) All pins are required to withstand this parameters.
  - 10) Input pins are required to withstand fig.2 without any degradation to the circuit.
  - 11) The balance test requirement can be met by use of a current limit circuit which reduces the input bias current  $I_{IB}$  (see figure 7) for input voltages below a threshold voltage given by  $(I_{IB} \times 1K) - 400mV$ .

Figure 1: Input Current Voltage Measurements



**Figure 2: EOS Requirements****Figure 3: Output Failsafing**

The output assumes a logic "1" under the following conditions, (see figure 3)

- 1 Both inputs open
- 2 Both inputs shorted
- 3 Signal Opencircuit
- 3a Common grounded, signal open circuit
- 4 Common open, generator powered-on
- 5 Generator powered-down (see note 7)
- 6 Common open, generator powered-down
- 6a Signal grounded, common open, generator powered-down
- 7 Less than 250mVpp differential signal

Figure 4: Threshold voltage definition

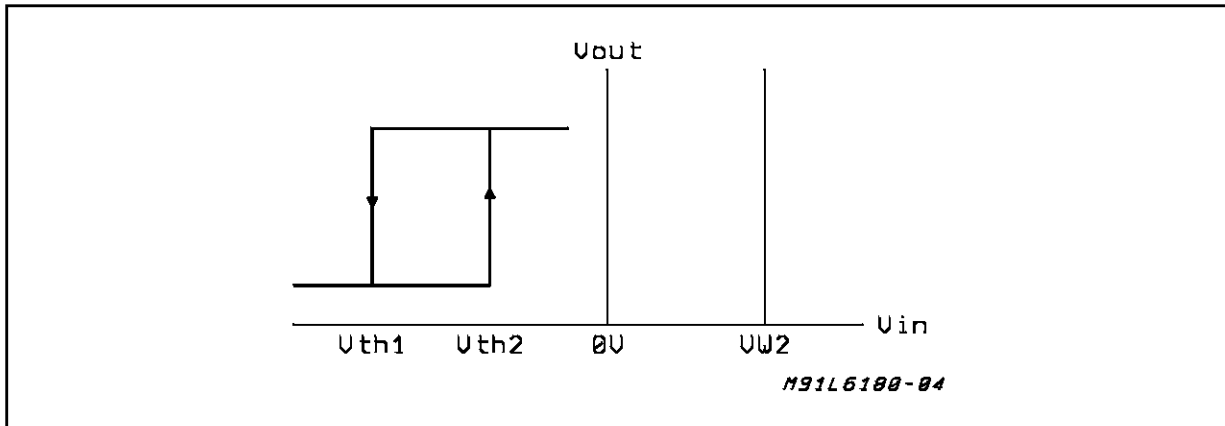


Figure 5: Propagation Delay

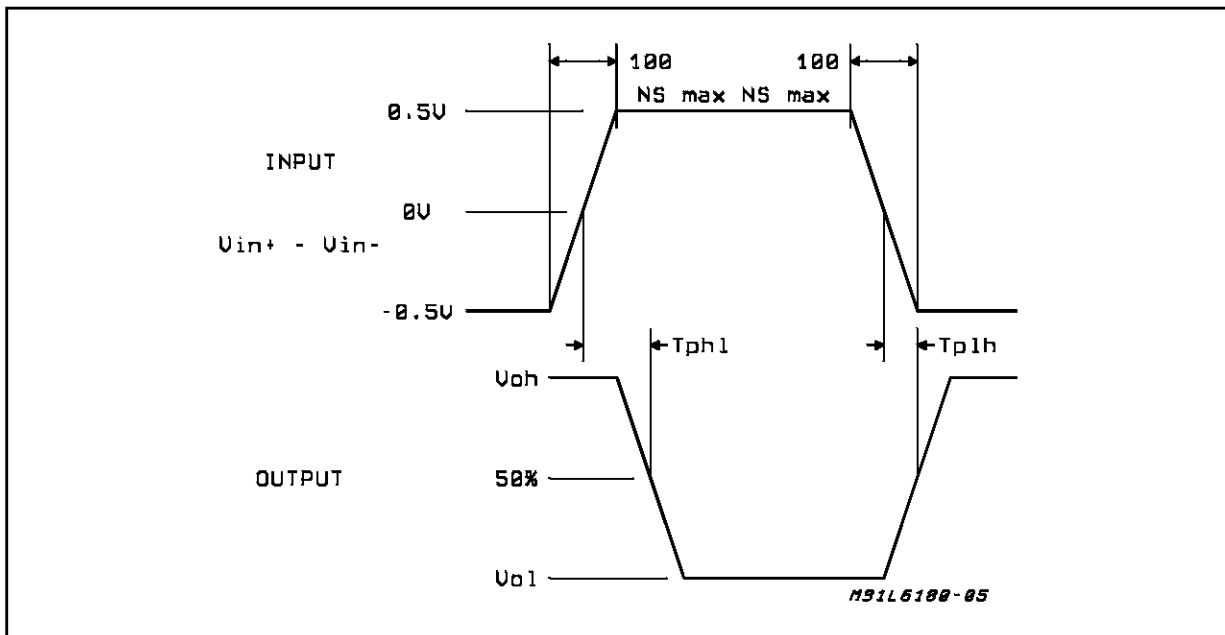
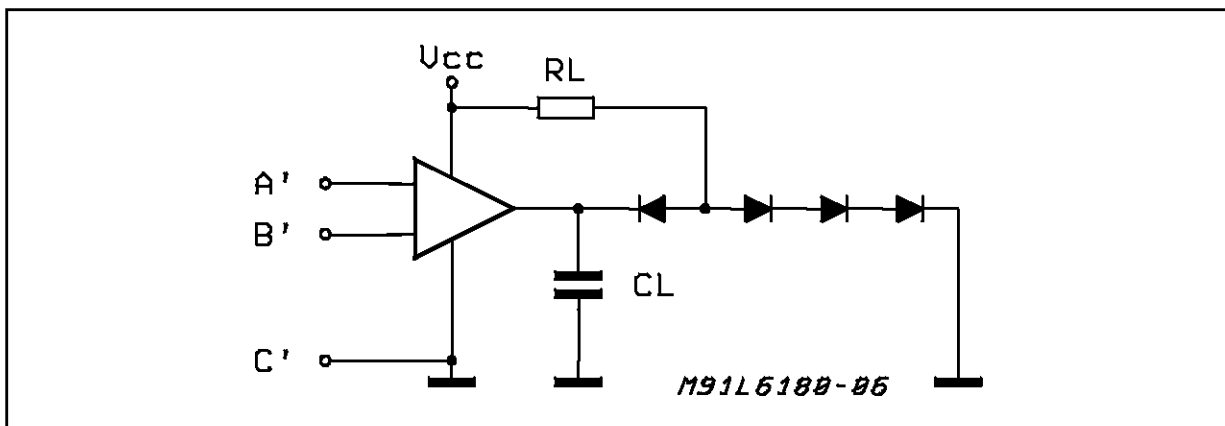
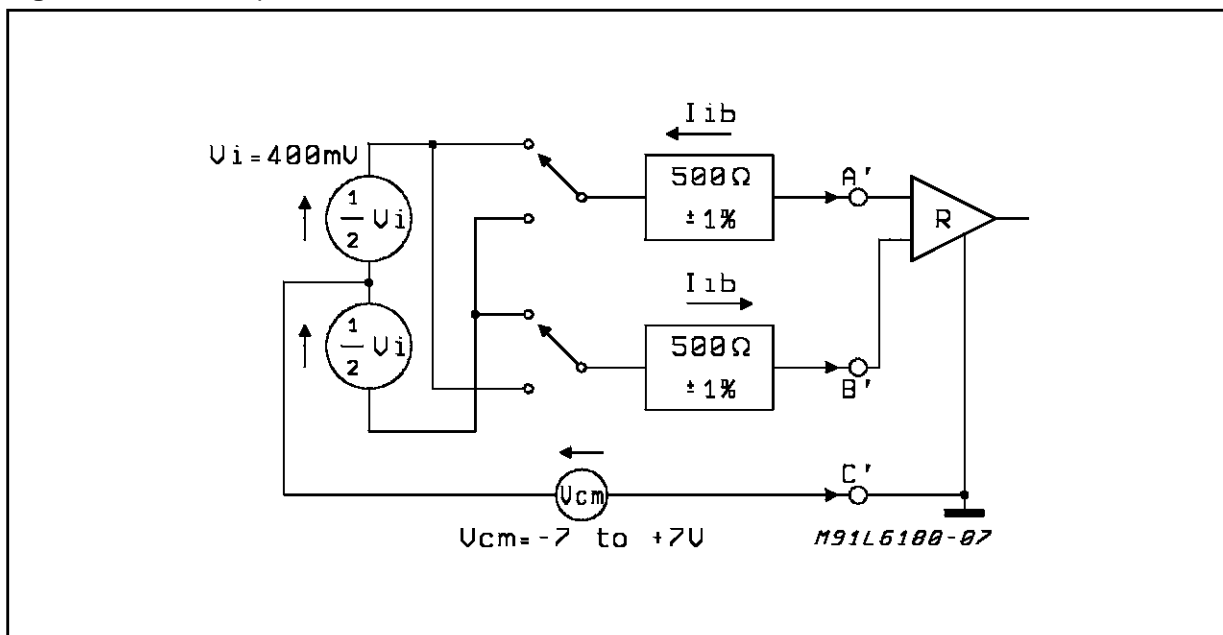


Figure 6: AC Test Circuit

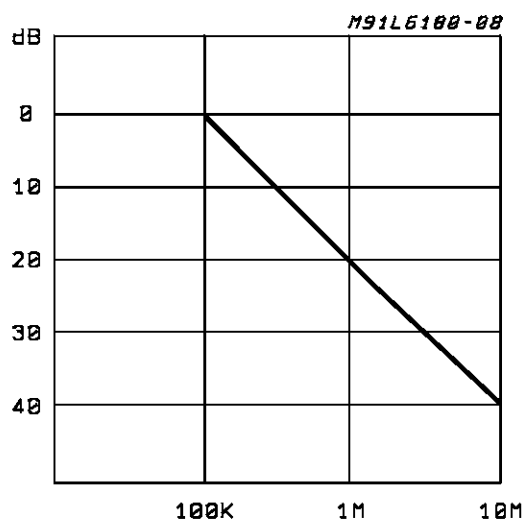


**Figure 7:** Receiver input Balance Measurement**Figure 8:** High Frequency Signal Rejection**INPUT BALANCE MEASUREMENT**

The balance of the receiver input voltage-current characteristics and bias voltages shall be such that the receiver will remain in the intended binary state when a differential voltage  $V_i$  of 400mV is applied through  $500\Omega \pm 1\%$  to each input terminal, as shown above, and  $V_{cm}$  is varied between -7 and +7V.

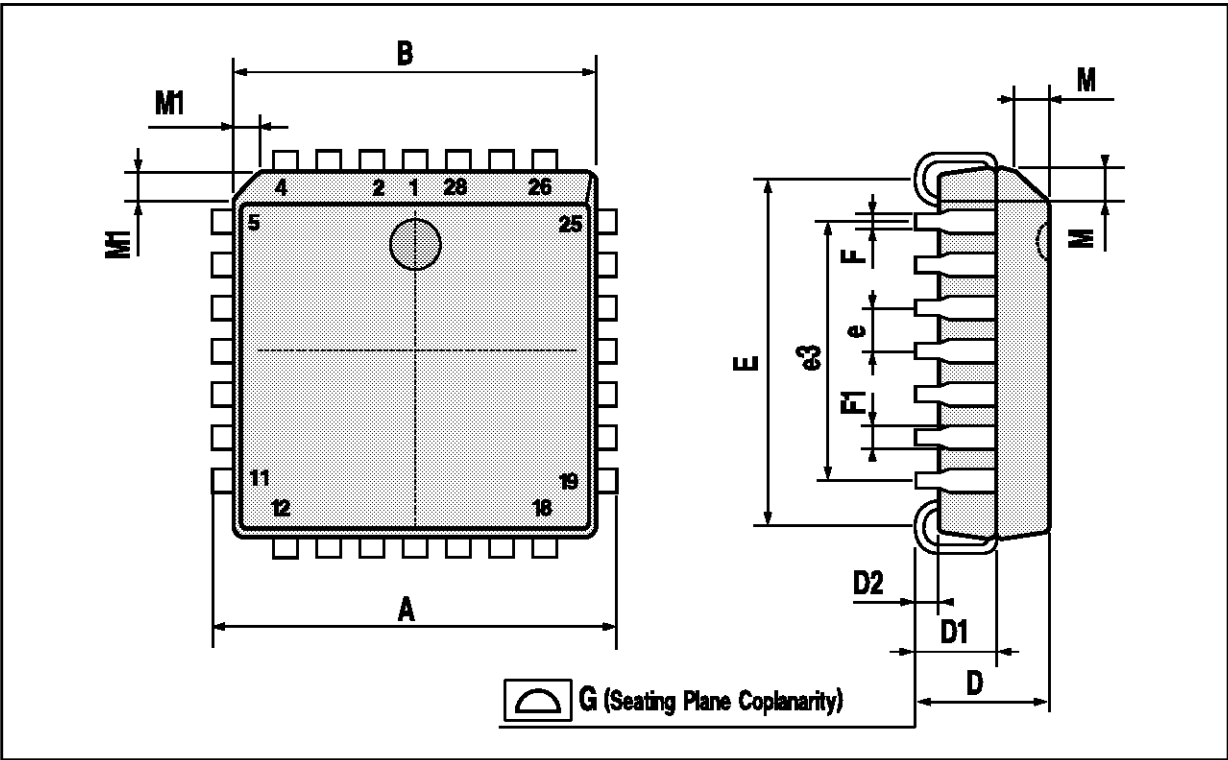
When the polarity of  $V_i$  is reversed, the opposite binary state shall be maintained under the same conditions. Maintain input balance with input B common with another receiver.

The voltage input ( $V_{IN}$ ) rejection is checked at the center point between the High Operating Threshold ( $V_{th2}$ ) and the Low Operating Threshold ( $V_{th1}$ )



PLCC28 PACKAGE MECHANICAL DATA

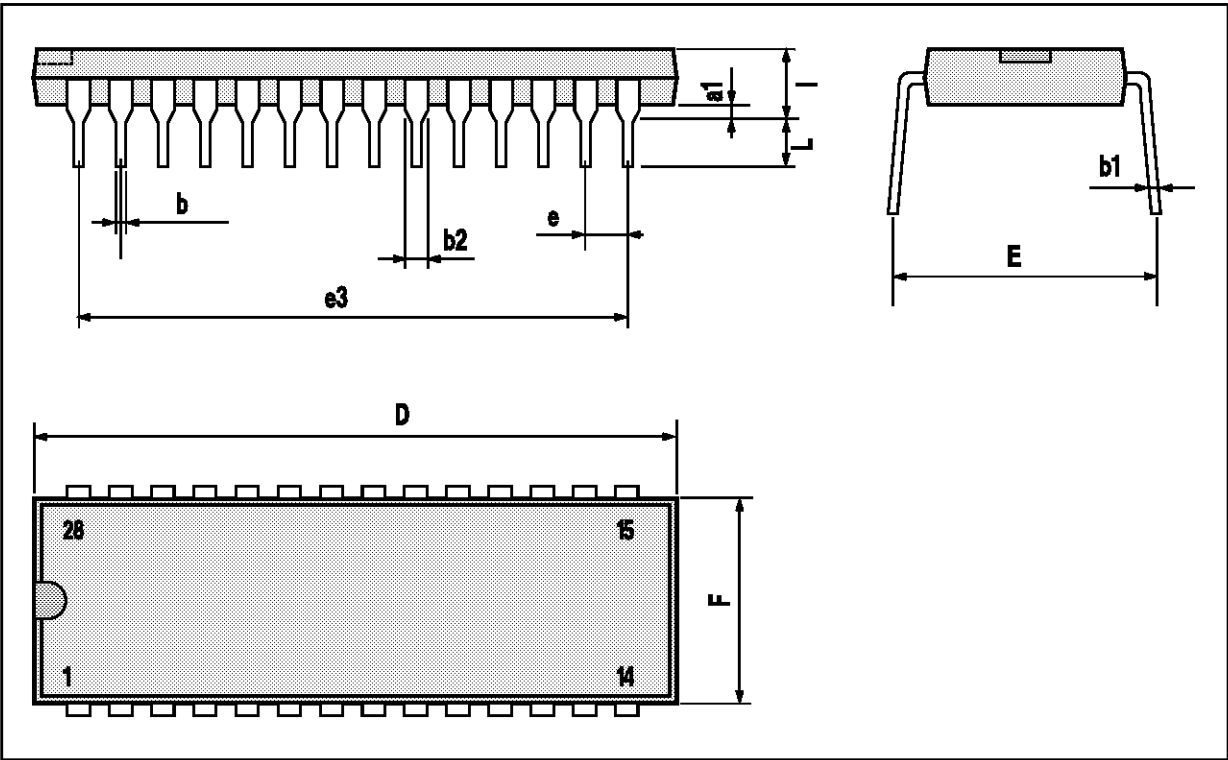
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	12.32		12.57	0.485		0.495
B	11.43		11.58	0.450		0.456
D	4.2		4.57	0.165		0.180
D1	2.29		3.04	0.090		0.120
D2	0.51			0.020		
E	9.91		10.92	0.390		0.430
e		1.27			0.050	
e3		7.62			0.300	
F		0.46			0.018	
F1		0.71			0.028	
G			0.101			0.004
M		1.24			0.049	
M1		1.143			0.045	





DIP28 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1		0.63			0.025	
b		0.45			0.018	
b1	0.23		0.31	0.009		0.012
b2		1.27			0.050	
D			37.34			1.470
E	15.2		16.68	0.598		0.657
e		2.54			0.100	
e3		33.02			1.300	
F			14.1			0.555
I		4.445			0.175	
L		3.3			0.130	



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