MOTOROLA
SEMICONDUCTOR
TECHNICAL DATA

MC3481
MC3485

IBM 360/370
QUAD LINE DRIVER

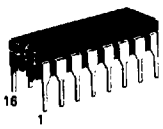
SILICON MONOLITHIC
INTEGRATED CIRCUIT

QUAD SINGLE-ENDED LINE DRIVER

The MC3481 and MC3485 are quad single-ended line drivers specifically designed to meet the IBM 360/370 I/O specification (GA22-6974-3).

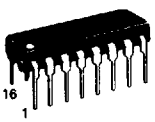
Output levels are guaranteed over the full range of output load and fault conditions. Compliance with the IBM requirements for fault protection, flagging, and power up/power down protection for the bus make this an ideal line driver for party line operations.

- Separate Enable and Fault Flags — MC3481
- Common Enable and Fault Flag — MC3485
- Power Up/Down Does Not Disturb Bus
- Schottky Circuitry for High-Speed — PNP Inputs
- Internal Bootstraps for Faster Rise Times
- Driver Output Current Foldback Protection
- MC3485 has LS Totem Pole Driver Output

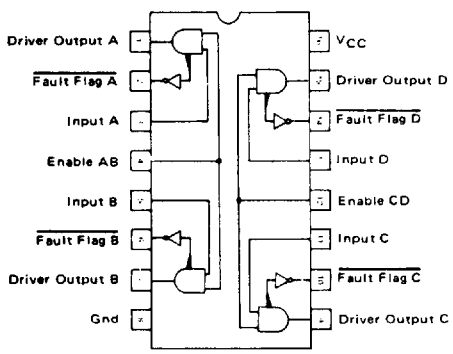


L SUFFIX
CERAMIC PACKAGE
CASE 620

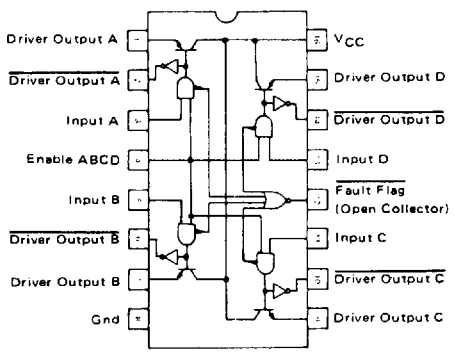
P SUFFIX
PLASTIC PACKAGE
CASE 648



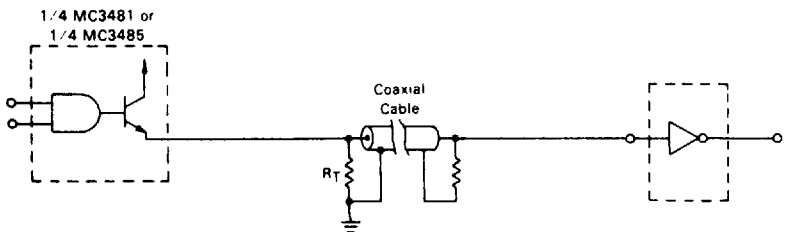
MC3481
DUAL ENABLE
INDIVIDUAL FAULT FLAG



MC3485
COMMON ENABLE
COMMON FAULT FLAG



TYPICAL APPLICATION



MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	+7.0	V
Input Voltage	V_I	10	V
Driver Output Voltage	V_O	5.5	V
Power Dissipation (Package Limitation) Ceramic Package Plastic Package	P_D	1150 962	mW
Derate Above T_A = 25°C	$1/R_{\theta JA}$	7.7	mW/°C
Operating Ambient Temperature Range	T_A	0 to +70	°C
Junction Temperature Ceramic Package Plastic Package	T_J	+175 +150	°C
Storage Temperature Range	T_{stg}	−65 to +150	°C

RECOMMENDED OPERATING CONDITIONS

Characteristic	Symbol	Min	Typ	Max	Unit
Power Supply Voltage	V_{CC}	4.5	5.0	5.95	Vdc
High Level Output Current	I_{OH}	—	—	−59.3	mA
Operating Ambient Temperature Range	T_A	0	—	+70	°C

SWITCHING CHARACTERISTICS (See Note 1. Unless otherwise noted, these specifications apply over recommended temperature range. I/O Driver characteristics are guaranteed for V_{CC} = 5.0 V ±10% and Select-Out Driver characteristics are guaranteed for V_{CC} = 5.25 to 5.95 V. Typical values measured at T_A = 25°C and V_{CC} = 5.0 V. See Tables 1 and 2, Figures 1 and 2 for load conditions.)

Characteristics	Symbol	Min	Typ	Max	Unit
Propagation Delay Time					ns
High-to-Low-Level, Driver Output					
As I/O Driver	$t_{PHL(D)}$	—	18	—	
As Select-Out Driver	$t_{PHL(DS)}$	—	19	—	
Low-to-High-Level, Driver Output					
As I/O Driver	$t_{PLH(D)}$	—	20	—	
As Select-Out Driver	$t_{PLH(DS)}$	—	21	—	
High-to-Low-Level, $\overline{\text{Driver Output}}$					
As I/O Driver	$t_{PHL(\bar{D})}$	—	25	—	
As Select-Out Driver	$t_{PHL(\bar{D}S)}$	—	26	—	
Low-to-High-Level, $\overline{\text{Driver Output}}$					
As I/O Driver	$t_{PLH(\bar{D})}$	—	25	—	
As Select-Out Driver	$t_{PLH(\bar{D}S)}$	—	26	—	
High-to-Low-Level, $\overline{\text{Fault Flag}}$ — MC3481					
As I/O Driver	$t_{PHL(\bar{F})}$	—	45	—	
As Select-Out Driver	$t_{PHL(\bar{F}S)}$	—	47	—	
Low-to-High-Level, $\overline{\text{Fault Flag}}$ — MC3481					
As I/O Driver	$t_{PLH(\bar{F})}$	—	40	—	
As Select-Out Driver	$t_{PLH(\bar{F}S)}$	—	42	—	
Ratio of Propagation Delay Times As I/O Driver	$\frac{t_{PLH(D)}}{t_{PHL(D)}}$	—	1.0	—	

Notes 1. Reference IBM specification GA22-6974-3 for test terminology.

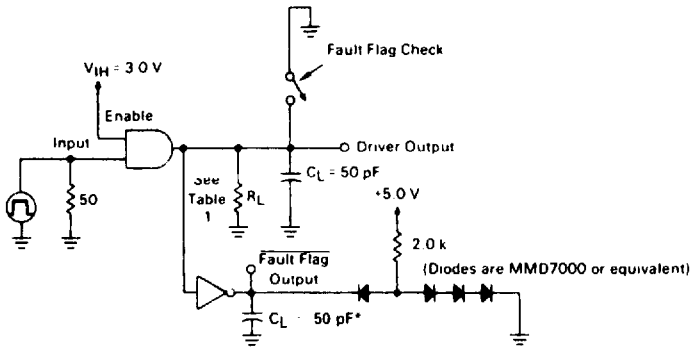
2. The fault protection circuitry of the MC3481/85 requires relatively clean input voltage waveforms for current operation. Noise pulses which enter the threshold region (0.8 to 2.0 V) may cause the output to enter the fault protect mode. To exit the protect mode, it is necessary to gate an input of the effected driver to the low logic state.

MC3481, MC3485

ELECTRICAL CHARACTERISTICS (Unless otherwise noted, these specifications apply over recommended power supply and temperature ratings. Typical values measured at T_A = 25°C and V_{CC} = +5.0 V)

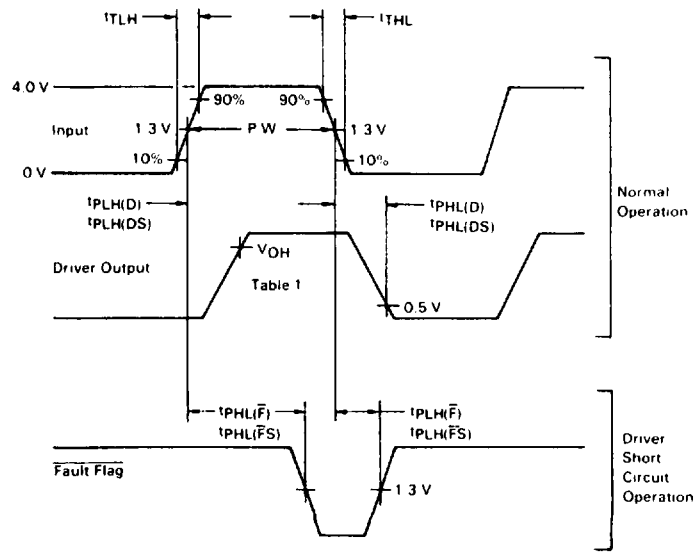
Characteristic	Symbol	MC3481			MC3485			Unit
		Min	Typ	Max	Min	Typ	Max	
High-Level Input Voltage Note 2	V_{IH}	2.0	—	—	2.0	—	—	V
Low-Level Input Voltage Note 2	V_{IL}	—	—	0.8	—	—	0.8	V
High-Level Input Current	I_{IH}							μA
(V_{CC} = 4.5 V, V_{IH} = 2.7 V) - Input		—	—	20	—	—	20	
Enable		—	—	40	—	—	80	
(V_{CC} = 4.5 V, V_{IH} = 5.5 V) - Input		—	—	100	—	—	100	
Enable		—	—	200	—	—	400	
Low-Level Input Current	I_{IL}							μA
(V_{CC} = 5.95 V, V_{IL} = 0.4 V) - Input		—	—	-250	—	—	-250	
Enable		—	—	-500	—	—	-1000	
Input Clamp Voltage	V_{IC}							V
(I_{IC} = -18 mA)		—	—	-1.5	—	—	-1.5	
High-Level Driver Output Voltage								V
(V_{CC} = 4.5 V, V_{IH} = 2.0 V, I_{OH} = -59.3 mA)	$V_{OH(D)}$	3.11	3.6	—	3.11	3.6	—	
(V_{CC} = 5.25 V, V_{IH} = 2.0 V, I_{OH} = -41 mA)	$V_{OH(DS)}$	3.9	—	—	3.9	—	—	
Low-Level Driver Output Voltage								V
(V_{CC} = 5.5 V, V_{IL} = 0.8 V, I_{OL} = -240 μA)	$V_{OL(D)}$	—	—	+0.15	—	—	+0.15	
(V_{CC} = 5.95 V, V_{IL} = 0.8 V, I_{OL} = -1.0 mA)	$V_{OL(DS)}$	—	—	+0.15	—	—	+0.15	
Driver Output Short Circuit Current								mA
(V_{CC} = 5.5 V, V_{IH} = 2.0 V, V_{OS} = 0 V)	$I_{OS(D)}$	—	—	-5.0	—	—	-5.0	
(V_{CC} = 5.95 V, V_{IH} = 2.0 V, V_{OS} = 0 V)	$I_{OS(DS)}$	—	—	-5.0	—	—	-5.0	
Driver Output Reverse Leakage Current								μA
(V_{CC} = 4.5 V, V_{IL} = 0 V, V_O = 3.11 V)	I_{OR1}	—	—	+100	—	—	+100	
(V_{CC} = 0 V, V_{IL} = 0 V, V_O = 3.11 V)	I_{OR2}	—	—	+200	—	—	+200	
High-Level $\overline{\text{Driver Output}}$ Voltage	$V_{OH(\overline{D})}$	—	—	—	2.5	3.0	—	V
(V_{CC} = 4.5 V, V_{IL} = 0.8 V, I_{OH} = -400 μA)								
Low-Level $\overline{\text{Driver Output}}$ Voltage	$V_{OL(\overline{D})}$	—	—	—	—	—	0.5	V
(V_{CC} = 4.5 V, V_{IH} = 2.0 V, I_{OL} = +8.0 mA)								
$\overline{\text{Driver Output}}$ Short Circuit Current								mA
(V_{CC} = 5.5 V, V_{OS} = 0 V, only one output shorted at a time)	$I_{OS(\overline{D})}$	—	—	—	-15	-60	-100	
(V_{CC} = 5.95 V, V_{OS} = 0 V, only one output shorted at a time)	$I_{OS(\overline{DS})}$	—	—	—	-15	—	-110	
High-Level $\overline{\text{Fault Flag}}$ Output Voltage	$V_{OH(\overline{F})}$	2.5	3.0	—	—	—	—	V
(V_{CC} = 4.5 V, I_{OH} = -400 μA)								
Low-Level $\overline{\text{Fault Flag}}$ Output Voltage	$V_{OL(\overline{F})}$	—	—	0.5	—	—	0.5	V
(V_{CC} = 4.5 V, V_{IH} = 2.0 V, I_{OL} = +8.0 mA, Driver Output shorted to Ground								
$\overline{\text{Fault Flag}}$ Output Short Circuit Current								mA
(V_{CC} = 5.5 V, V_{OS} = 0 V, only one output shorted at a time)	$I_{OS(\overline{F})}$	-15	—	-100	—	—	—	
(V_{CC} = 5.95 V, V_{OS} = 0 V, only one output shorted at a time)	$I_{OS(\overline{FS})}$	-15	—	-110	—	—	—	
High-Level $\overline{\text{Fault Flag}}$ Output Current	$I_{OH(\overline{F})}$	—	—	—	—	—	+100	μA
(V_{CC} = 5.95 V, V_{OH} = 5.95 V)								
High-Level Power Supply Current								mA
(V_{CC} = 5.5 V, V_{IH} = 2.0 V, no output loading)	I_{CCH}	—	50	70	—	55	75	
(V_{CC} = 5.95 V, V_{IH} = 2.0 V, no output loading)	I_{CCHS}	—	—	80	—	—	85	
Low-Level Power Supply Current								mA
(V_{CC} = 5.5 V, V_{IL} = 0.8 V, no output loading)	I_{CCL}	—	35	55	—	35	55	
(V_{CC} = 5.95 V, V_{IL} = 0.8 V, no output loading)	I_{CCLS}	—	—	70	—	—	70	

FIGURE 1 — MC3481 AC TEST CIRCUIT AND WAVEFORMS



* Load Capacitance shown includes Fixture and Probe Capacitance

Table 1	Driver Application	
	I/O	Select-Out
V_{OH}	3.11 V	3.9 V
Input Frequency	5 MHz	1 MHz
Input Pulse Width	100 ns	500 ns
Input Amplitude	0 V to 4 V	0 V to 4 V
Input t_{TLH}	≤6 ns	≤ 6 ns
Input t_{THL}	≤6 ns	≤6 ns
Load Resistance (R_L)	50	90



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FIGURE 2 — MC3485 AC TEST CIRCUIT AND WAVEFORMS

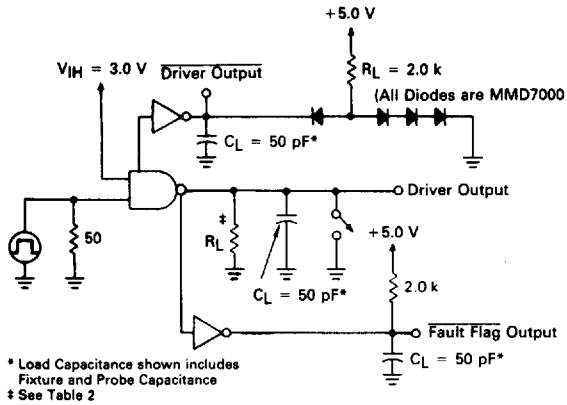


Table 2	Driver Application	
	I/O	Select-Out
V_{OH}	3.11 V	3.9 V
Input Frequency	5 MHz	1 MHz
Input Pulse Width	100 ns	500 ns
Input Amplitude	0 V to 4 V	0 V to 4 V
Input t_{TLH}	≤6 ns	≤6 ns
Input t_{THL}	≤6 ns	≤6 ns
Load Resistance (R_L)	50	90

7

