

**MOTOROLA**

Dual EIA-422/423 Transceivers

The MC34050/51 are dual transceivers which comply with EIA Standards EIA-422 (Balanced line) and EIA-423 (Unbalanced line). Each device contains two drivers and two receivers.

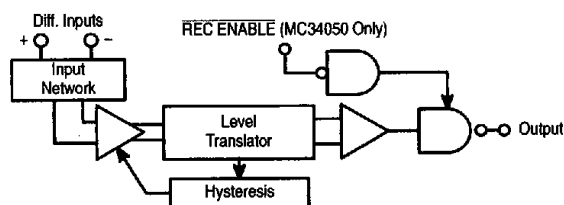
The MC34050 has a DRIVER ENABLE (for both drivers) and a RECEIVER ENABLE (for both receivers). Connecting the two ENABLES together provides Driver-to-Receiver switching from a single line.

The MC34051 has a DRIVER ENABLE for each driver. The two receivers are permanently enabled.

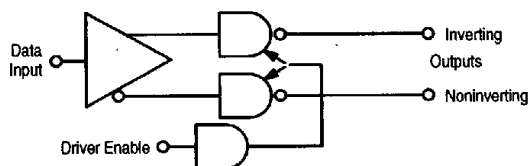
The Driver inputs, Receiver outputs, and Enable inputs are 74LS TTL compatible.

- Two Independent Drivers and Receivers Per Package
- 3-State Outputs
- Single 5.0 V Supply
- Internal Hysteresis (50 mV Typical) on Receivers
- Receivers Provide Fail-Safe Function. Output Stays High if Inputs are Open, Shorted (floating), or Terminated (floating)
- Receivers May Be Used in EIA-422 or 423 Systems
- Drivers Meet Full EIA-422 Standards

Receiver Block Diagram



Driver Block Diagram



TRUTH TABLE

Driver				Receiver		
Data	EN	Inv. Out	Noninv. Out	Input	EN	Output
L	H	H	L	$> +0.2$ V Diff.	L	H
H	H	L	H	< -0.2 V Diff.	L	L
X	L	Z	Z	X	H	Z

MC34050 MC34051

DUAL EIA-422/423 TRANSCIVERS

SEMICONDUCTOR TECHNICAL DATA

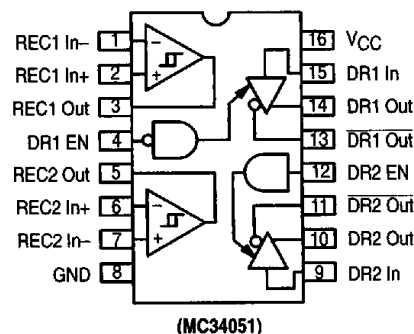
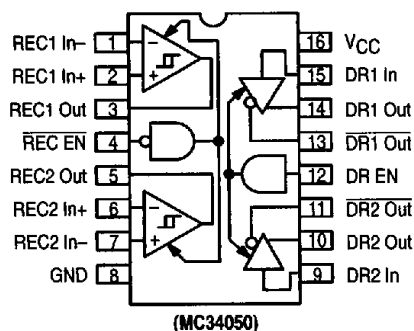


D SUFFIX
PLASTIC PACKAGE
CASE 751B
(SO-16)

P SUFFIX
PLASTIC PACKAGE
CASE 648



PIN CONNECTIONS



ORDERING INFORMATION

Device	Operating Temperature Range	Package
MC34050D	$T_A = 0^\circ$ to $+70^\circ\text{C}$	SO-16
MC34050P		Plastic DIP
MC34051P		Plastic DIP
MC34051D		SO-16

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MOTOROLA ANALOG IC DEVICE DATA

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MC34050 MC34051

MAXIMUM RATINGS

Rating	Value	Units
Power Supply Voltage (V_{CC})	7.0	Vdc
Input Common Mode Voltage (Receivers)	± 25	Vdc
Input Differential Voltage (Receivers)	± 25	Vdc
Output Sink Current (Receivers)	50	mA
Enable Input Voltage (Drivers and Receivers)	5.5	Vdc
Input Voltage (Drivers)	5.5	Vdc
Applied Output Voltage (3-State mode) – Receivers	-1.0 to +7.0	Vdc
Applied Output Voltage (3-State mode) – Drivers	-1.0 to +7.0	Vdc
Junction Temperature	-65 to +150	°C
Storage Temperature	-65 to +150	°C

Devices should not be operated at these values.
The "Recommended Operating Limits" provide for actual device operation.

RECOMMENDED OPERATING LIMITS

Characteristic	Min	Typ	Max	Unit
Power Supply Voltage	+4.75	+5.0	+5.25	Vdc
Input Common Mode Voltage (Receivers)	-7.0	—	+7.0	Vdc
Input Differential Voltage (Receivers)	-6.0	—	+6.0	Vdc
Enable Input Voltage (Drivers and Receivers)	0	—	+5.25	Vdc
Input Voltage (Drivers)	0	—	+5.25	Vdc
Ambient Temperature Range	0	—	+70	°C

ELECTRICAL CHARACTERISTICS (Unless otherwise noted, specifications apply for $4.75 < V_{CC} < 5.25$ V, and $0^\circ < T_A < 70^\circ\text{C}$).

Characteristic	Symbol	Min	Typ	Max	Unit
DRIVERS					
Input Voltage – Low	V_{ILD}	—	—	0.8	Vdc
Input Voltage – High	V_{IHD}	2.0	—	—	Vdc
Input Current @ $V_{IL} = 0.4$ V	I_{ILD}	-360	—	—	μA
Input Current @ $V_{IH} = 2.7$ V $V_{IH} = 5.25$ V	I_{IHD}	— —	— —	+20 +100	μA
Input Clamp Voltage ($I_{IK} = -18$ mA)	V_{IKD}	-1.5	—	—	Vdc
Output Voltage – Low ($I_{OL} = 20$ mA)	V_{OLD}	—	—	0.5	Vdc
Output Voltage – High ($I_{OH} = -20$ mA)	V_{OHD}	2.5	—	—	Vdc
Output Offset Voltage Difference (Note 1)	V_{OSD}	-0.4	—	+0.4	Vdc
Output Differential Voltage (Note 1)	V_T	2.0	—	—	Vdc
Output Differential Voltage Difference (Note 1)	V_{TD}	-0.4	—	+0.4	Vdc
Short Circuit Current ($V_{CC} = 5.25$ V) (From High Output, Note 2)	I_{OSD}	-150	—	-30	mA
Output Leakage Current – Hi-Z State ($V_{out} = 0.5$ V, DR EN = 0.8 V) ($V_{out} = 2.7$ V, DR EN = 0.8 V)	I_{OZD}	-100 -100	— —	+100 +100	μA
Output Leakage – Power Off ($V_{out} = -0.25$ V, $V_{CC} = 0$ V) ($V_{out} = 6.0$ V, $V_{CC} = 0$ V)	$I_{O(off)}$	-100 —	— —	— +100	μA

NOTES: 1. See EIA Standard EIA-422 and Figure 1 for exact test conditions.
2. Only one output in a package should be shorted at a time, for no longer than 1 second.

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MC34050 MC34051

ELECTRICAL CHARACTERISTICS (Unless otherwise noted, specifications apply for $4.75 < V_{CC} < 5.25$ V, and $0^\circ < T_A < 70^\circ\text{C}$).

Characteristic	Symbol	Min	Typ	Max	Unit
RECEIVERS					
Differential Input Threshold Voltage (Note 3) ($-7.0 \text{ V} < V_{ICM} < 7.0$, $V_{out} \geq 2.7 \text{ V}$) ($-7.0 \text{ V} < V_{ICM} < 7.0$, $V_{out} \leq 0.45 \text{ V}$)	V_{THR}	– –0.2	– –	+0.2 –	Vdc
Input Bias Current ($0 \leq V_{CC} \leq 5.25 \text{ V}$, $V_{in} = 15 \text{ V}$) ($0 \leq V_{CC} \leq 5.25 \text{ V}$, $V_{in} = -15 \text{ V}$)	I_{IBR}	– –2.8	– –	+2.3 –	mA
Input Balance and Output Level ($-7.0 \leq V_{ICM} \leq 7.0 \text{ V}$) ($V_{ID} = 0.4 \text{ V}$, $I_O = -400 \mu\text{A}$) ($V_{ID} = -0.4 \text{ V}$, $I_O = 8.0 \text{ mA}$)	V_{OHR} V_{OLR}	2.7 –	– –	– 0.45	Vdc
Output Leakage Current – 3-State (Pin 4 = 2.0 V, MC34050 only) ($V_{ID} = 3.0 \text{ V}$, $V_O = 0.4 \text{ V}$) ($V_{ID} = -3.0 \text{ V}$, $V_O = 2.4 \text{ V}$)	I_{OZR}	–100 –100	– –	+100 +100	μA
Output Short Circuit Current (Note 2, $V_{CC} = 5.25 \text{ V}$) ($V_{ID} = 3.0 \text{ V}$, MC34050 Pin 4 = 0.4 V, $V_O = 0 \text{ V}$)	I_{OSR}	–85	–	–15	mA

ENABLES

Input Voltage – Low	V_{ILE}	–	–	0.8	Vdc
Input Voltage – High	V_{IHE}	2.0	–	–	Vdc
Input Current @ $V_{IL} = 0.4 \text{ V}$ (Receiver EN) (Driver EN)	I_{ILER} I_{ILED}	–100 –360	– –	– –	μA
Input Current @ $V_{IH} = 2.7 \text{ V}$ $V_{IH} = 5.25 \text{ V}$	I_{IHE}	– –	– –	+20 +100	μA
Input Clamp Voltage ($I_{IK} = -18 \text{ mA}$)	V_{IKE}	–1.5	–	–	Vdc

POWER SUPPLY

Power Supply Current @ $V_{CC} = 5.25 \text{ V}$	I_{CC}	–	55	80	mA
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NOTES: 2. Only one output in a package should be shorted at a time, for no longer than 1 second.
3. Differential input threshold voltage and guaranteed output levels are done simultaneously for worst case.

DRIVER SWITCHING CHARACTERISTICS ($V_{CC} = 5.0 \text{ V}$, $T_A = 25^\circ\text{C}$, see Figure 2).

Characteristic	Symbol	Min	Typ	Max	Unit
Propagation Delay					ns
Data Input to Output High-to-Low	t_{PHLD}	–	–	20	
Data Input to Output Low-to-High	t_{PLHD}	–	–	20	
Output Skew ($ t_{PHL} - t_{PLH} $ each driver)	t_{SKD}	–	–	8	
Enable Input to Output					
$C_L = 10 \text{ pF}$, $R_L = 75 \Omega$ to Gnd	t_{PHZD}	–	–	30	
$C_L = 10 \text{ pF}$, $R_L = 180 \Omega$ to V_{CC}	t_{PLZD}	–	–	35	
$C_L = 30 \text{ pF}$, $R_L = 75 \Omega$ to Gnd	t_{PZHD}	–	–	40	
$C_L = 30 \text{ pF}$, $R_L = 180 \Omega$ to V_{CC}	t_{PZLD}	–	–	45	
Maximum Data Input Transition Time (10% to 90%)	t_{TRD}	–	50	–	ns

RECEIVER SWITCHING CHARACTERISTICS ($V_{CC} = 5.0 \text{ V}$, $T_A = 25^\circ\text{C}$, see Figure 3).

Characteristic	Symbol	Min	Typ	Max	Unit
Propagation Delay					ns
Differential Input to Output – High-to-Low	t_{PHLR}	–	–	30	
Differential Input to Output – Low-to-High	t_{PLHR}	–	–	30	
Enable Input – Output Low to 3-State	t_{PLZR}	–	–	35	
Enable Input – Output High to 3-State	t_{PHZR}	–	–	35	
Enable Input – Output 3-State to High	t_{PZHR}	–	–	30	
Enable Input – Output 3-State to Low	t_{PZLR}	–	–	30	

MC34050 Only

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