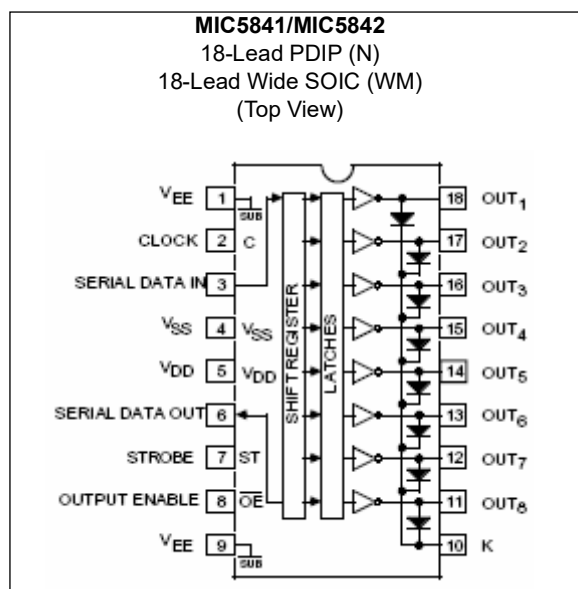


8-Bit Serial Input Latched Drivers

Features

- 3.3 MHz Minimum Data Input Rate
- CMOS, PMOS, NMOS, TTL Compatible
- Internal Pull-Up/Pull-Down Resistors
- Low-Power CMOS Logic and Latches
- High-Voltage Current Sink Outputs
- Output Transient Protection Diodes
- Single or Split Supply Operation

Package Types



General Description

Using BiCMOS technology, the MIC5841 and MIC5842 integrated circuits are fabricated to be used in a wide variety of peripheral power driver applications. The devices each have an eight-bit CMOS shift register, CMOS control circuitry, eight CMOS data latches, and eight bipolar current-sink Darlington output drivers.

These two devices differ only in maximum voltage ratings. The MIC5842 offers premium performance with a minimum output breakdown voltage rating of 80V (50V sustaining). The drivers can be operated with a split supply where the negative supply is down to -20V.

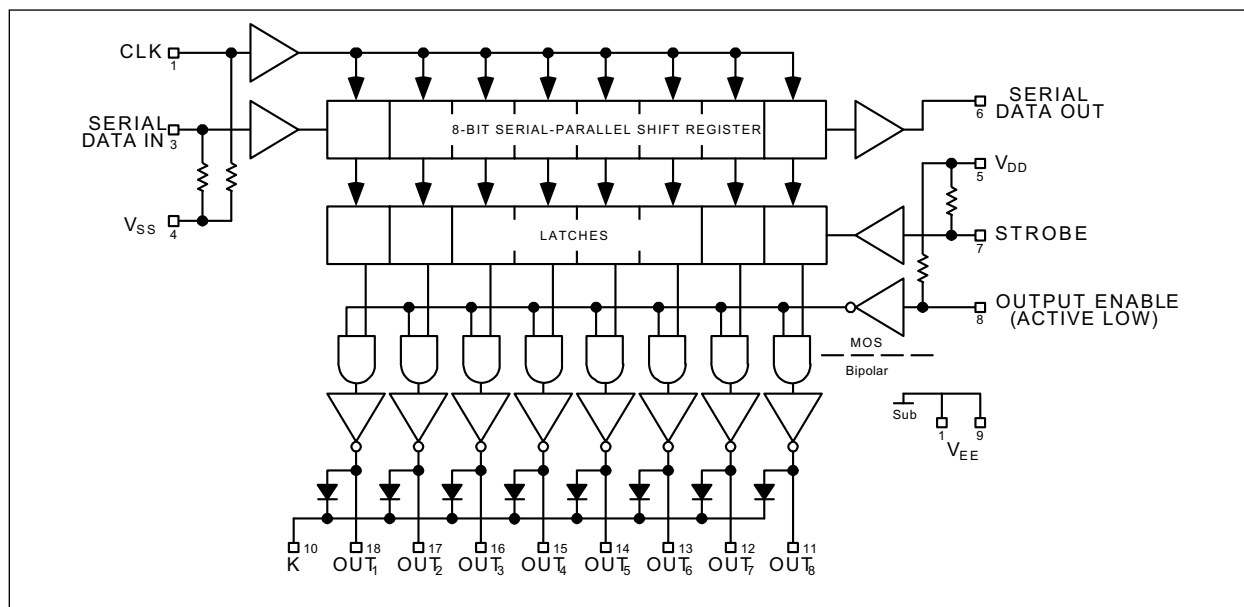
The 500 mA outputs, with integral transient suppression diodes, are suitable for use with lamps, relays, solenoids, and other inductive loads.

These devices have improved speed characteristics. With a 5V logic supply, they will typically operate faster than 5 MHz. With a 12V supply, significantly higher speeds are obtained. The CMOS inputs are compatible with standard CMOS, PMOS, and NMOS logic levels. TTL or DTL circuits may require the use of appropriate pull-up resistors. By using the serial data output, the drivers can be cascaded for interface applications requiring additional drive lines.

The MIC5840 family is available in PDIP and SOIC packages. Because of limitations on package power dissipation, the simultaneous operation of all drivers at the maximum rated current might require a reduction in duty cycle. A copper-alloy lead frame provides for maximum package power dissipation.

MIC5841/2

Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings † (Note 3)

Input Voltage Range (V_{IN})	–0.3V to $V_{DD} + 0.3V$
V_{SS} (Free-Air at +25°C)	0V
Output Voltage (V_{CE} , MIC5841)	+50V
Output Voltage (V_{CE} , MIC5842)	+80V
Output Voltage ($V_{CE(SUS)}$, MIC5841, Note 1)	+35V
Output Voltage ($V_{CE(SUS)}$, MIC5842)	+50V
Logic Supply Voltage (V_{DD})	+15V
V_{DD} with Reference to V_{EE}	+25V
Emitter Supply Voltage (V_{EE})	–20V
Continuous Output Current (I_{OUT})	500 mA
Package Power Dissipation (P_D , Note 2)	1.82W

† **Notice:** Stresses above those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at those or any other conditions above those indicated in the operational sections of this specification is not intended. Exposure to maximum rating conditions for extended periods may affect device reliability.

Note 1: For inductive load applications

2: Derate at the rate of 18.2 mW/°C above $T_A = +25^\circ\text{C}$ (PDIP).

3: CMOS devices have input-static protection, but are susceptible to damage when exposed to extremely high static electrical charges.

ELECTRICAL CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $V_{DD} = 5V$, $V_{SS} = V_{EE} = 0V$ (unless otherwise noted).

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Output Leakage Current	I_{CEX}	—	—	50	μA	MIC5841, $V_{OUT} = 50V$
		—	—	100		MIC5841, $V_{OUT} = 50V$, $T_A = +70^\circ\text{C}$
		—	—	50		MIC5842, $V_{OUT} = 80V$
		—	—	100		MIC5842, $V_{OUT} = 80V$, $T_A = +70^\circ\text{C}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	—	1.1	V	$I_{OUT} = 100\text{ mA}$
		—	—	1.3		$I_{OUT} = 200\text{ mA}$
		—	—	1.6		$I_{OUT} = 350\text{ mA}$, $V_{DD} = 7.0V$
Collector-Emitter Saturation Voltage (Note 1)	$V_{CE(SUS)}$	35	—	—	V	MIC5841, $I_{OUT} = 350\text{ mA}$, $L = 2\text{ mH}$
		50	—	—		MIC5842, $I_{OUT} = 350\text{ mA}$, $L = 2\text{ mH}$
Input Voltage	$V_{IN(0)}$	—	—	0.8	V	—
	$V_{IN(1)}$	10.5	—	—	V	$V_{DD} = 12V$
		8.5	—	—		$V_{DD} = 10V$
		3.5	—	—		$V_{DD} = 5.0V$, Note 2
Input Resistance	R_{IN}	50	—	—	k Ω	$V_{DD} = 12V$
		50	—	—		$V_{DD} = 10V$
		50	—	—		$V_{DD} = 5.0V$

MIC5841/2

ELECTRICAL CHARACTERISTICS (CONTINUED)

At $T_A = +25^\circ\text{C}$, $V_{DD} = 5\text{V}$, $V_{SS} = V_{EE} = 0\text{V}$ (unless otherwise noted).

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Supply Current	$I_{DD(ON)}$	—	—	16	mA	All drivers ON, $V_{DD} = 12\text{V}$
		—	—	14		All drivers ON, $V_{DD} = 10\text{V}$
		—	—	8.0		All drivers ON, $V_{DD} = 5.0\text{V}$
	$I_{DD(OFF)}$	—	—	2.9		All drivers OFF, $V_{DD} = 12\text{V}$
		—	—	2.5		All drivers OFF, $V_{DD} = 10\text{V}$
		—	—	1.6		All drivers OFF, $V_{DD} = 5.0\text{V}$
		—	—	—		—
Clamp Diode Leakage Current	I_R	—	—	50	μA	MIC5841, $V_R = 50\text{V}$
		—	—	50		MIC5842, $V_R = 80\text{V}$
Clamp Diode Forward Voltage	V_F	—	—	2.0	V	$I_F = 350\text{ mA}$

Note 1: Not 100% tested. Ensured by design.

2: Operation of these devices with standard TTL may require the use of appropriate pull-up resistors to ensure an input logic HIGH.

ELECTRICAL CHARACTERISTICS

At $T_A = -40^\circ\text{C}$, $V_{DD} = 5\text{V}$, $V_{SS} = V_{EE} = 0\text{V}$ (unless otherwise noted).

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Output Leakage Current	I_{CEX}	—	—	50	μA	$V_{OUT} = 80\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	—	1.3	V	$I_{OUT} = 100\text{ mA}$
		—	—	1.5		$I_{OUT} = 200\text{ mA}$
		—	—	1.8		$I_{OUT} = 350\text{ mA}$, $V_{DD} = 7.0\text{V}$
Input Voltage	$V_{IN(0)}$	—	—	0.8	V	—
	$V_{IN(1)}$	10.5	—	—		$V_{DD} = 12\text{V}$
		3.5	—	—		$V_{DD} = 5.0\text{V}$
Input Resistance	R_{IN}	35	—	—	k Ω	$V_{DD} = 12\text{V}$
		35	—	—		$V_{DD} = 10\text{V}$
		35	—	—		$V_{DD} = 5.0\text{V}$
Supply Current	$I_{DD(ON)}$	—	—	16	mA	All drivers ON, $V_{DD} = 12\text{V}$
		—	—	14		All drivers ON, $V_{DD} = 10\text{V}$
		—	—	10		All drivers ON, $V_{DD} = 5.0\text{V}$
	$I_{DD(OFF)}$	—	—	3.5		All drivers OFF, $V_{DD} = 12\text{V}$
		—	—	2.0		All drivers OFF, $V_{DD} = 10\text{V}$
		—	—	—		All drivers OFF, $V_{DD} = 5.0\text{V}$

ELECTRICAL CHARACTERISTICS

At $T_A = +85^\circ\text{C}$, $V_{DD} = 5\text{V}$, $V_{SS} = V_{EE} = 0\text{V}$ (unless otherwise noted).

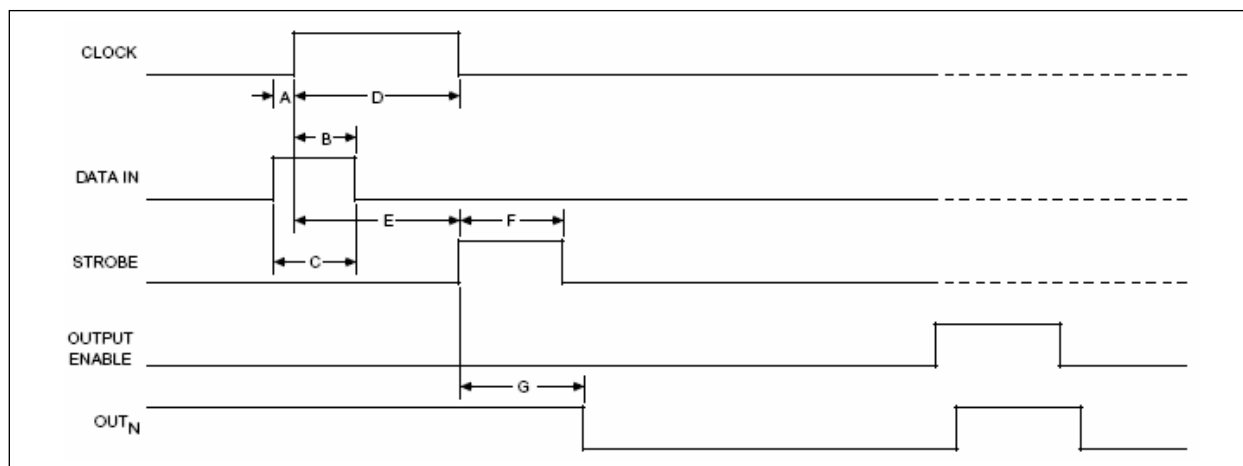
Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions
Output Leakage Current	I_{CEX}	—	—	500	μA	$V_{OUT} = 80\text{V}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	—	—	1.3	V	$I_{OUT} = 100\text{ mA}$
		—	—	1.5		$I_{OUT} = 200\text{ mA}$
		—	—	1.8		$I_{OUT} = 350\text{ mA}$, $V_{DD} = 7.0\text{V}$
Input Voltage	$V_{IN(0)}$	—	—	0.8	V	—
	$V_{IN(1)}$	10.5	—	—		$V_{DD} = 12\text{V}$
		3.5	—	—		$V_{DD} = 5.0\text{V}$
Input Resistance	R_{IN}	50	—	—	$\text{k}\Omega$	$V_{DD} = 12\text{V}$
		50	—	—		$V_{DD} = 10\text{V}$
		50	—	—		$V_{DD} = 5.0\text{V}$
Supply Current	$I_{DD(ON)}$	—	—	16	mA	All drivers ON, $V_{DD} = 12\text{V}$
		—	—	14		All drivers ON, $V_{DD} = 10\text{V}$
		—	—	8		All drivers ON, $V_{DD} = 5.0\text{V}$
	$I_{DD(OFF)}$	—	—	2.9		All drivers OFF, $V_{DD} = 12\text{V}$
		—	—	1.6		All drivers OFF, $V_{DD} = 5.0\text{V}$
		—	—	1.6		MIC5841, $V_R = 50\text{V}$
Clamp Diode Leakage Current	I_R	—	—	100	μA	MIC5842, $V_R = 80\text{V}$

TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Temperature Range	T_A	-40	—	+85	$^\circ\text{C}$	—
Storage Temperature Range	T_S	-65	—	+150	$^\circ\text{C}$	—

MIC5841/2

2.0 TIMING DIAGRAM



2.1 Timing Conditions

Conditions: T _A = +25°C, Logic Levels are V _{DD} and V _{SS} .		V _{DD} = 5V
A	Minimum Data Active Time Before Clock Pulse (Data Set-Up Time)	75 ns
B	Minimum Data Active Time After Clock Pulse (Data Hold Time)	75 ns
C	Minimum Data Pulse Width	150 ns
D	Minimum Clock Pulse Width	150 ns
E	Minimum Time Between Clock Activation and Strobe	300 ns
F	Minimum Strobe Pulse Width	100 ns
G	Typical Time Between Strobe Activation and Output Transition	500 ns

SERIAL DATA present at the input is transferred to the shift register on the logic “0” to logic “1” transition of the CLOCK input pulse. On succeeding CLOCK pulses, the registers shift data information towards the SERIAL DATA OUTPUT. The SERIAL DATA must appear at the input prior to the rising edge of the CLOCK input waveform.

Information present at any register is transferred to its respective latch when the STROBE is high (serial-to-parallel conversion). The latches will continue to accept new data as long as the STROBE is held high. Applications where the latches are bypassed (STROBE tied high) will require that the ENABLE input be high during serial data entry.

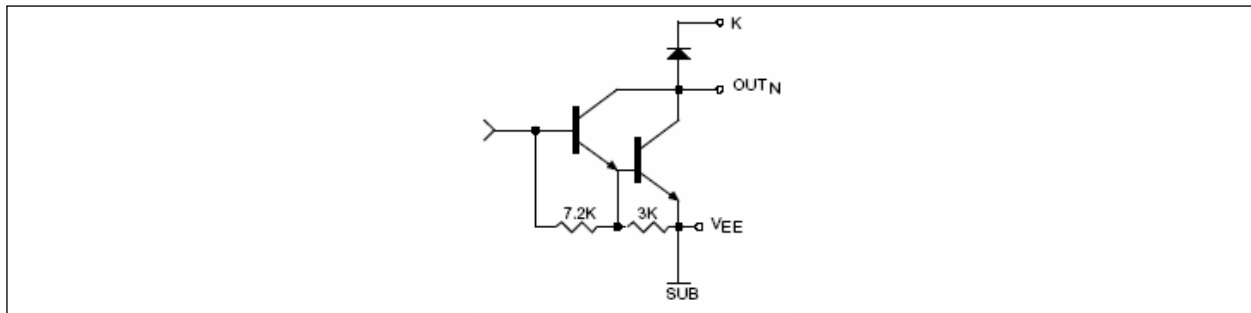
When the ENABLE input is high, all of the output buffers are disabled (OFF) without affecting information stored in the latches or shift register. With the ENABLE input low, the outputs are controlled by the state of the latches.

TABLE 2-1: MIC5841/2 FAMILY TRUTH TABLE

Serial Data Input	Clock Input	Shift Register Contents					Serial Data Output	Strobe Input	Latch Contents					Output Enable	Output Contents				
		I ₁	I ₂	I ₃	...	I ₈			I ₁	I ₂	I ₃	...	I ₈		O ₁	O ₂	O ₃	...	O ₈
H	—	H	R1	R2	...	R7	R7	—	—	—	—	—	—	—	—	—	—	—	—
L	—	L	R1	R2	...	R7	R7	—	—	—	—	—	—	—	—	—	—	—	—
X	—	R1	R2	R3	...	R8	R8	—	—	—	—	—	—	—	—	—	—	—	—
—	—	X	X	X	...	X	X	L	R1	R2	R3	...	R8	—	—	—	—	—	—
—	—	P1	P2	P3	...	P8	P8	H	P1	P2	P3	...	P8	L	P1	P2	P3	...	P8
—	—	—	—	—	...	—	—	—	X	X	X	...	X	H	H	H	H	...	H

L = Low Logic Level
H = High Logic Level
X = Irrelevant
P = Present State
R = Previous State

Typical Output Driver



Typical Input Circuits

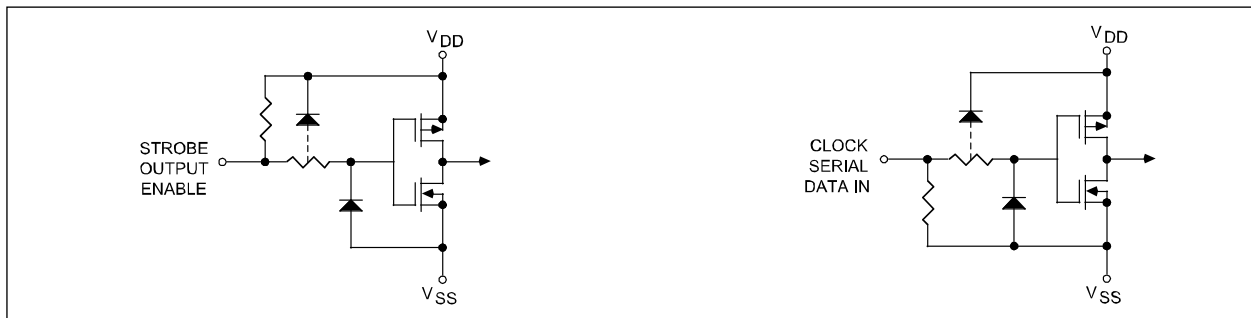


TABLE 2-2: MAXIMUM ALLOWABLE DUTY CYCLE (PDIP), $V_{DD} = 5.0V$

Number of Outputs ON ($I_{OUT} = 200\text{ mA}$ $V_{DD} = 5.0V$)	Maximum Allowable Duty Cycle at Ambient Temperature of				
	25°C	40°C	50°C	60°C	70°C
8	85%	72%	64%	55%	46%
7	97%	82%	73%	63%	53%
6	100%	96%	85%	73%	62%
5	100%	100%	100%	88%	75%
4	100%	100%	100%	100%	93%
3	100%	100%	100%	100%	100%
2	100%	100%	100%	100%	100%
1	100%	100%	100%	100%	100%

TABLE 2-3: MAXIMUM ALLOWABLE DUTY CYCLE (PDIP), $V_{DD} = 12V$

Number of Outputs ON ($I_{OUT} = 200\text{ mA}$ $V_{DD} = 12V$)	Maximum Allowable Duty Cycle at Ambient Temperature of				
	25°C	40°C	50°C	60°C	70°C
8	80%	68%	60%	52%	44%
7	91%	77%	68%	59%	50%
6	100%	90%	79%	69%	58%
5	100%	100%	95%	82%	69%
4	100%	100%	100%	100%	86%
3	100%	100%	100%	100%	100%
2	100%	100%	100%	100%	100%
1	100%	100%	100%	100%	100%

MIC5841/2

3.0 TYPICAL APPLICATIONS

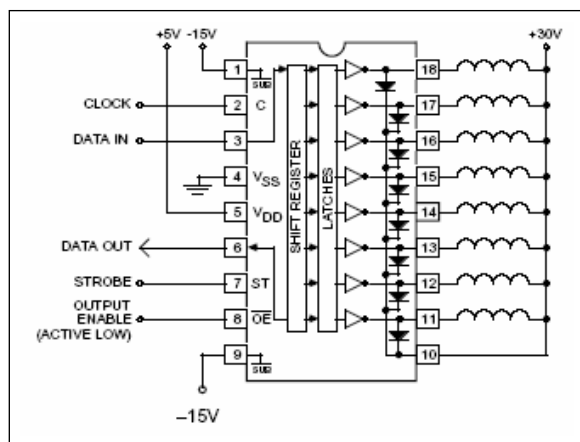


FIGURE 3-1: MIC5842 Relay/Solenoid Driver.

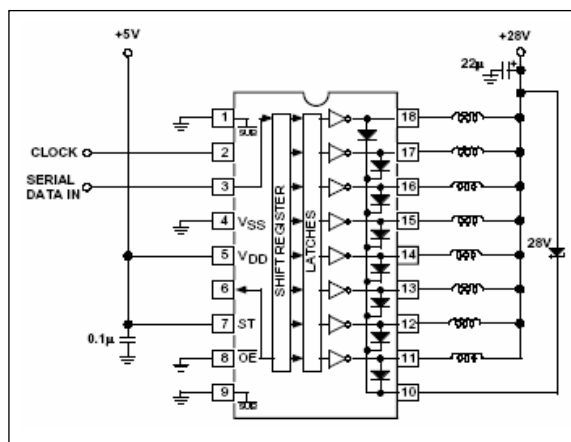


FIGURE 3-3: MIC5841 Hammer Driver.

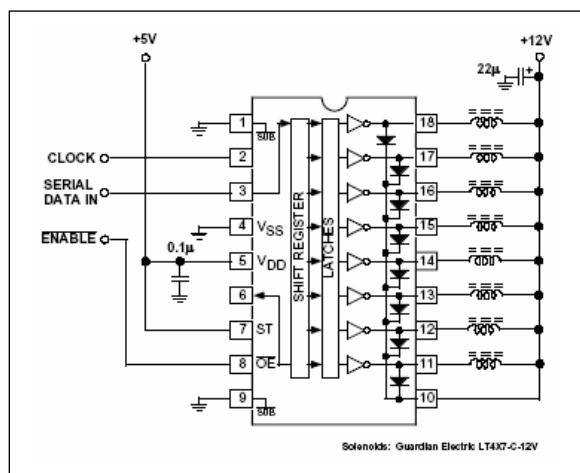


FIGURE 3-2: MIC5841 Solenoid Driver with Output Enable.

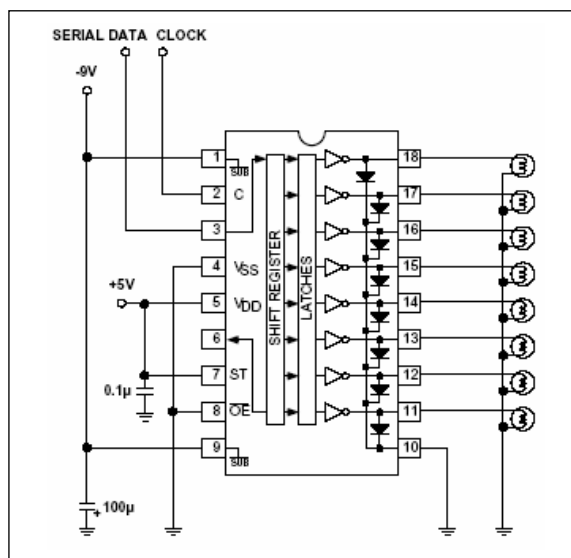


FIGURE 3-4: MIC5841 Level Shifting Lamp Driver with Darlington Emitters Tied to a Negative Supply.

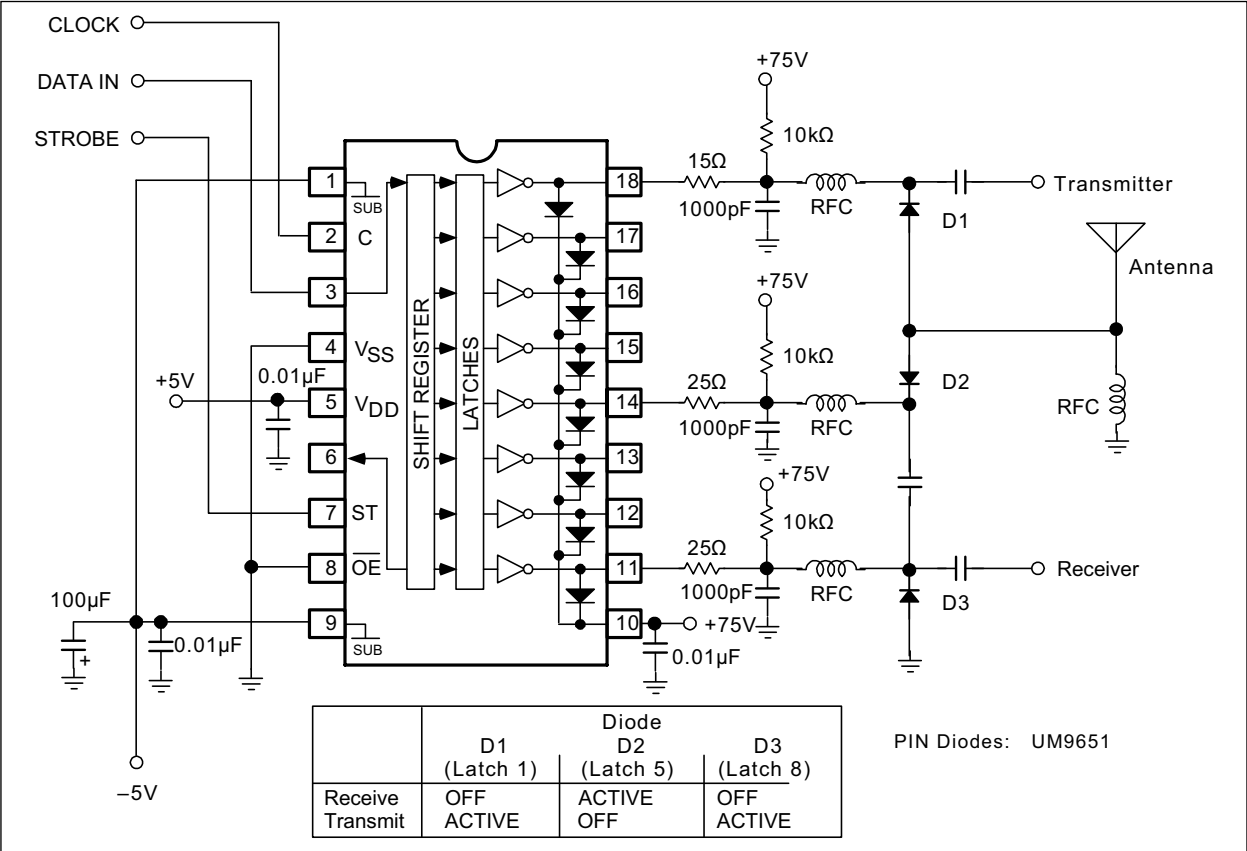


FIGURE 3-5: MIC5841 Antenna Switch Driver.

4.0 PACKAGING INFORMATION

4.1 Package Marking Information

18-Lead PDIP*

XXX
XXXXXX
WNNN

Example

MIC
5841YN
7K0S

18-Lead Wide SOIC*

XXXXXXXX
XXXXXXXXXX
WNNN

Example

MICREL
MIC5842YWM
1HA7

Legend:

XX...X

Y

YY

WW

NNN

(e3)

*

•, ▲, ▼

Product code or customer-specific information

Year code (last digit of calendar year)

Year code (last 2 digits of calendar year)

Week code (week of January 1 is week '01')

Alphanumeric traceability code

Pb-free JEDEC® designator for Matte Tin (Sn)

This package is Pb-free. The Pb-free JEDEC designator ((e3)) can be found on the outer packaging for this package.

Pin one index is identified by a dot, delta up, or delta down (triangle mark).

Note:

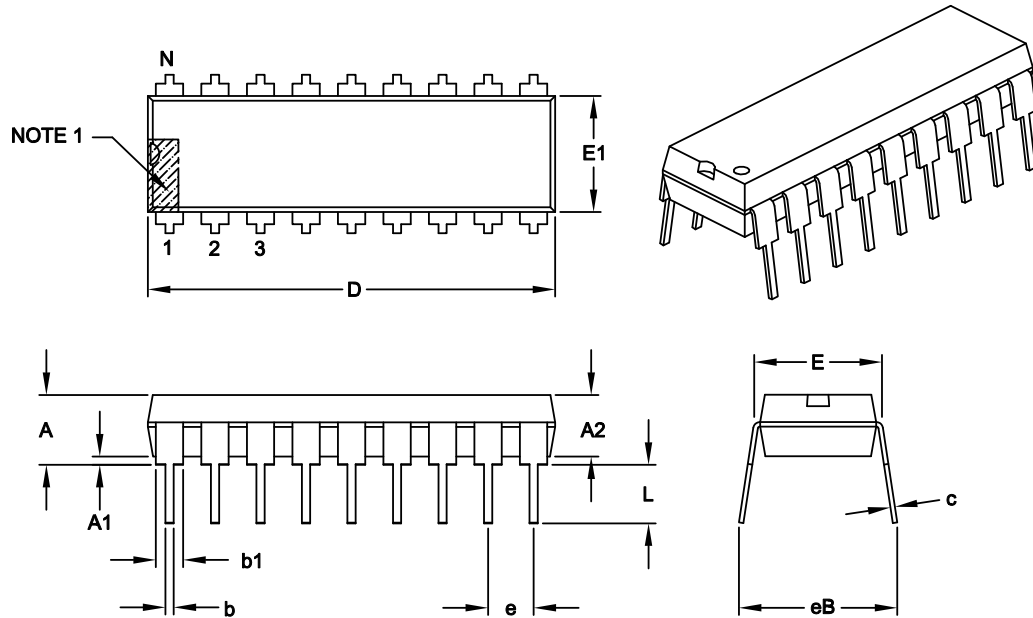
In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.

Underbar (_) and/or Overbar (¯) symbol may not be to scale.

Note: If the full seven-character YYWWNNN code cannot fit on the package, the following truncated codes are used based on the available marking space:
6 Characters = YWWNNN; 5 Characters = WWNNN; 4 Characters = WNNN; 3 Characters = NNN;
2 Characters = NN; 1 Character = N

18-Lead Plastic Dual In-Line (P) - 300 mil Body [PDIP]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	18		
Pitch	e	.100 BSC		
Top to Seating Plane	A	-	-	.210
Molded Package Thickness	A2	.115	.130	.195
Base to Seating Plane	A1	.015	-	-
Shoulder to Shoulder Width	E	.300	.310	.325
Molded Package Width	E1	.240	.250	.280
Overall Length	D	.880	.900	.920
Tip to Seating Plane	L	.115	.130	.150
Lead Thickness	c	.008	.010	.014
Upper Lead Width	b1	.045	.060	.070
Lower Lead Width	b	.014	.018	.022
Overall Row Spacing	§ eB	-	-	.430

Notes:

- Pin 1 visual index feature may vary, but must be located within the hatched area.
- § Significant Characteristic
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010" per side.
- Dimensioning and tolerancing per ASME Y14.5M

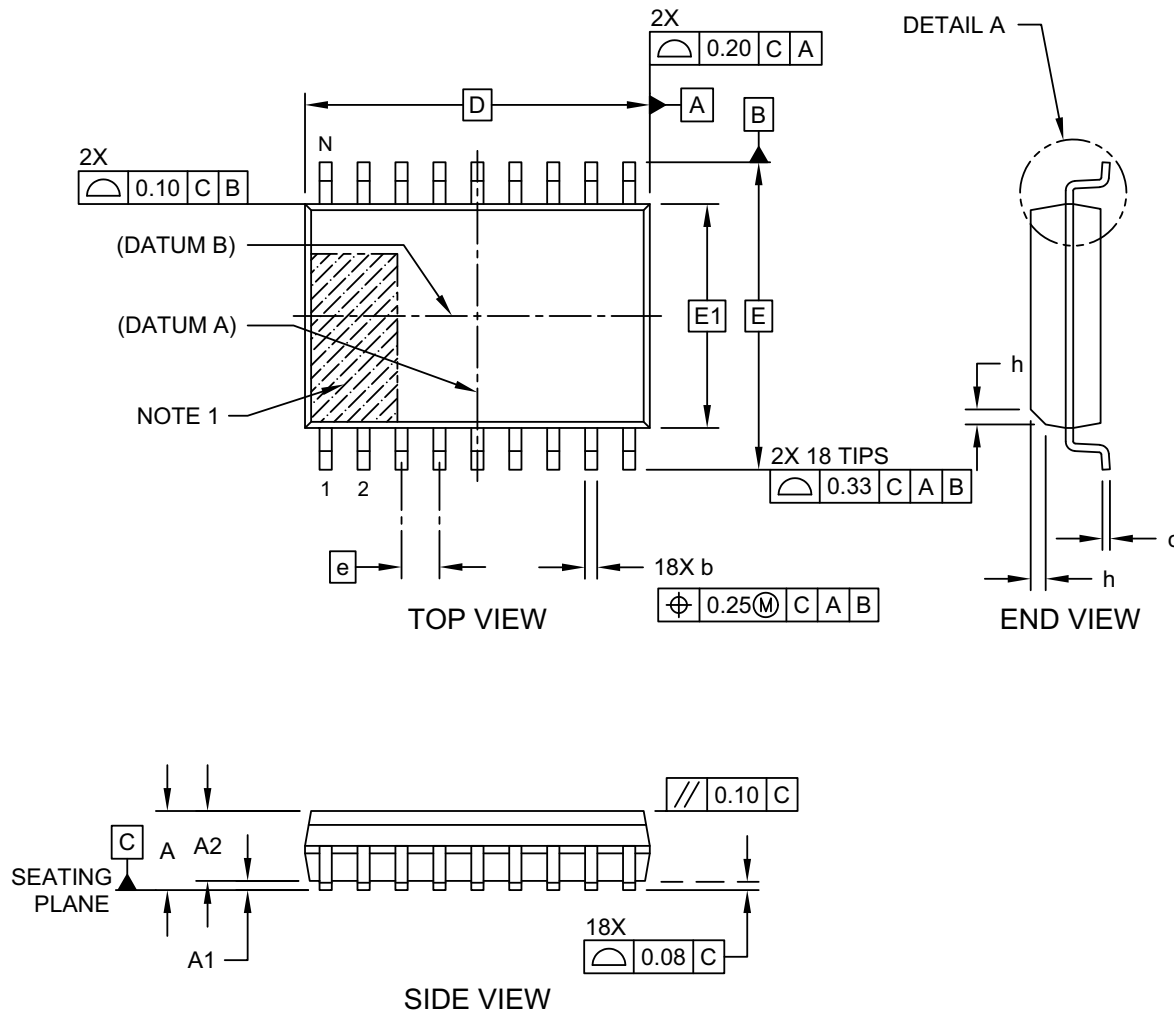
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing No. C04-007B

MIC5841/2

18-Lead Plastic Small Outline (SO, F2X, FJX, FKX) - Wide, 7.50 mm (.300 In.) Body [SOIC]

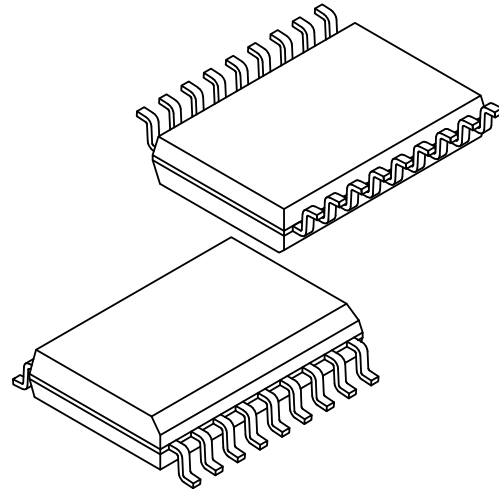
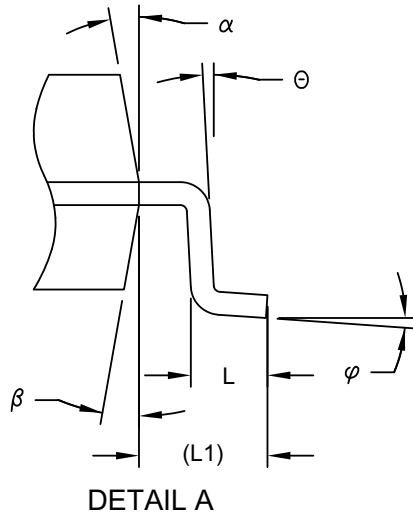
Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Microchip Technology Drawing C04-051E Sheet 1 of 2

18-Lead Plastic Small Outline (SO, F2X, FJX, FKX) - Wide, 7.50 mm (.300 In.) Body [SOIC]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	18		
Pitch	e	1.27 BSC		
Overall Height	A	-	-	2.65
Molded Package Thickness	A2	2.05	-	-
Standoff §	A1	0.10	-	0.30
Overall Width	E	10.30 BSC		
Molded Package Width	E1	7.50 BSC		
Overall Length	D	11.55 BSC		
Chamfer (Optional)	h	0.25	-	0.75
Foot Length	L	0.40	-	1.27
Footprint	L1	1.40 REF		
Lead Angle	Θ	0°	-	-
Foot Angle	φ	0°	-	8°
Lead Thickness	c	0.20	-	0.33
Lead Width	b	0.31	-	0.51
Mold Draft Angle Top	α	5°	-	15°
Mold Draft Angle Bottom	β	5°	-	15°

Notes:

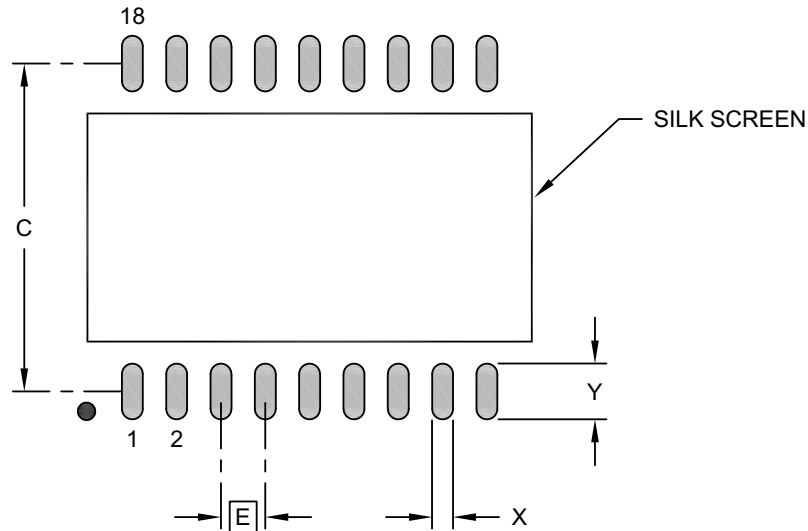
- Pin 1 visual index feature may vary, but must be located within the hatched area.
- § Significant Characteristic
- Dimension D does not include mold flash, protrusions or gate burrs, which shall not exceed 0.15 mm per end. Dimension E1 does not include interlead flash or protrusion, which shall not exceed 0.25 mm per side.
- Dimensioning and tolerancing per ASME Y14.5M
 - BSC: Basic Dimension. Theoretically exact value shown without tolerances.
 - REF: Reference Dimension, usually without tolerance, for information purposes only.

Microchip Technology Drawing No. C04-051E Sheet 2 of 2

MIC5841/2

18-Lead Plastic Small Outline (SO,F2X, FJX, FKX) - Wide, 7.50 mm (.300 In.) Body [SOIC]

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/packaging>



RECOMMENDED LAND PATTERN

Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Contact Pitch	E	1.27 BSC		
Contact Pad Spacing	C		9.40	
Contact Pad Spacing				
Contact Pad Width (X18)	X			0.60
Contact Pad Length (X18)	Y			1.90

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M
BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-2051E

APPENDIX A: REVISION HISTORY

Revision A (November 2025)

- Converted Micrel document MIC5841/2 to Microchip data sheet DS20007075A.
- Minor text changes throughout.

MIC5841/2

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, contact your local Microchip representative or sales office.

<u>Part Number</u>	<u>X</u>	<u>X</u>	<u>-XX</u>	Examples:
Device	Temp. Range	Package	Media Type	
Device:	MIC5841:	8-Bit Serial Input Latched Driver, 50V _{OUT}		a) MIC5841YN: MIC5841, 50V V_{OUT}, -40°C to +85°C Temp. Range, 18-Lead PDIP, 21/Tube b) MIC5841YWM: MIC5841, 50V V_{OUT}, -40°C to +85°C Temp. Range, 18-Lead Wide SOIC, 41/Tube c) MIC5841YWM-TR: MIC5841, 50V V_{OUT}, -40°C to +85°C Temp. Range, 18-Lead Wide SOIC, 1,000/Reel d) MIC5842YN: MIC5842, 80V V_{OUT}, -40°C to +85°C Temp. Range, 18-Lead PDIP, 21/Tube e) MIC5842YWM: MIC5842, 80V V_{OUT}, -40°C to +85°C Temp. Range, 18-Lead Wide SOIC, 41/Tube f) MIC5842YWM-TR: MIC5842, 80V V_{OUT}, -40°C to +85°C Temp. Range, 18-Lead Wide SOIC, 1,000/Reel Note: Tape and Reel identifier only appears in the catalog part number description. This identifier is used for ordering purposes and is not printed on the device package. Check with your Microchip Sales Office for package availability with the Tape and Reel option.
	MIC5842:	8-Bit Serial Input Latched Driver, 80V _{OUT}		
Temperature Range:	Y	=	-40°C to +85°C	
Package:	N	=	18-Lead PDIP	
	WM	=	18-Lead Wide SOIC	
Media Type:	<blank>	=	21/Tube (PDIP only)	
	<blank>	=	41/Tube (SOIC only)	
	TR	=	1,000/Reel (SOIC only)	

MIC5841/2

NOTES:

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