

8-Bit Serial-Input Latched Drivers

Features

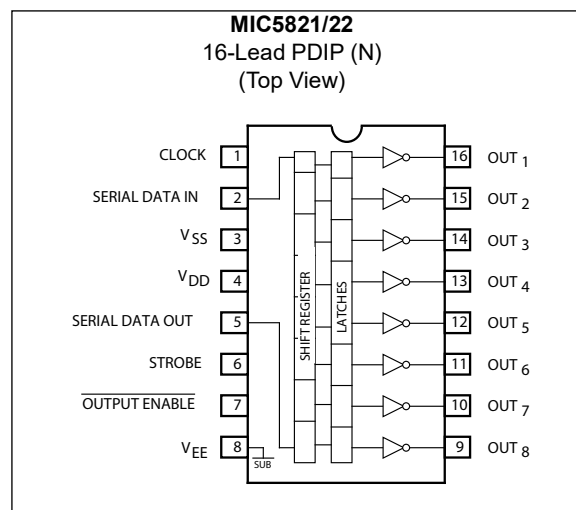
- 3.3 MHz Minimum Data Input Rate
- CMOS, PMOS, NMOS, TTL Compatible
- Internal Pull-Down or Pull-Up Resistors
- Low-Power CMOS Logic and Latches
- High-Voltage Current-Sink Outputs
- Single or Split Supply Operation

General Description

BiCMOS technology gives the MIC5821 and MIC5822 flexibility beyond the reach of standard logic buffers and power driver arrays. These devices each have an eight-bit CMOS shift register, CMOS control circuitry, eight CMOS data latches, and eight bipolar current-sink Darlington output drivers. The 500 mA outputs are suitable for use with incandescent bulbs and other moderate to high current loads. The drivers can be operated with a split supply where the negative supply is down to $-20V$. Except for maximum driver output voltage ratings, the MIC5821 and MIC5822 are identical.

These devices have greatly improved data input rates. 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 and 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 that require additional drive lines.

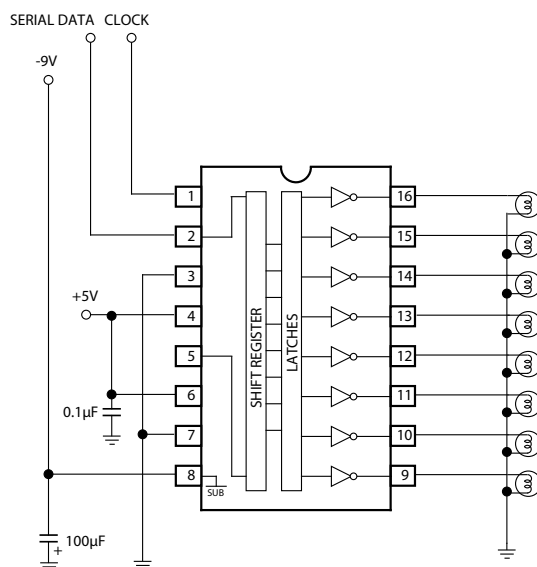
Package Type



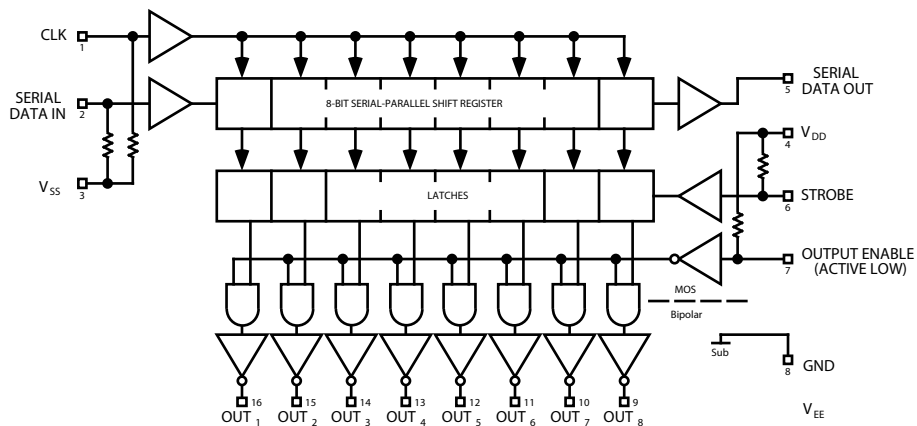
MIC5821/22

Typical Application Circuit

MIC5822 Level Shifting Lamp Driver with Darlington Emitters Tied to a Negative Supply



Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

(at +25°C free-air temperature and $V_{SS} = 0V$, [Note 1](#))

Output Voltage (MIC5821 V_{CE}).....	+50V
Output Voltage (MIC5822 V_{CE}).....	+80V
Output Voltage (MIC5821 V_{CE_SUS} , Note 3).....	+35V
Output Voltage (MIC5822 V_{CE_SUS} , Note 3).....	+50V
Logic Supply Voltage (V_{DD}).....	+15V
Input Voltage Range (V_{IN}).....	–0.3V to $V_{DD} + 0.3V$
$V_{DD} - V_{EE}$	25V
Emitter Supply Voltage (V_{EE})	–20V
Continuous Output Current (I_{OUT}).....	500 mA
Package Power Dissipation (P_D , Note 1).....	1.67W

† **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: Derate at the rate of 16.7 mW/°C above $T_A = +25^\circ C$.

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

3: For inductive load applications.

ELECTRICAL CHARACTERISTICS

$T_A = +25^\circ C$ $V_{DD} = 5V$, $V_{EE} = V_{SS} = 0V$ (unless otherwise specified) ([Note 1](#))

Parameter	Symbol	Applicable Devices	Min.	Max.	Units	Conditions
Output Leakage Current	I_{CEX}	MIC5821	—	50	μA	$V_{OUT} = 50V$
			—	100		$V_{OUT} = 50V$, $T_A = +70^\circ C$
		MIC5822	—	50		$V_{OUT} = 80V$
			—	100		$V_{OUT} = 80V$, $T_A = +70^\circ C$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	Both	—	1.1	V	$I_{OUT} = 100\text{ mA}$
			—	1.3		$I_{OUT} = 200\text{ mA}$
			—	1.6		$I_{OUT} = 350\text{ mA}$, $V_{DD} = 7.0V$
Input Voltage	$V_{IN(0)}$	Both	—	0.8	V	—
	$V_{IN(1)}$	Both	10.5	—		$V_{DD} = 12V$
			8.5	—		$V_{DD} = 10V$
			3.5	—		$V_{DD} = 5.0V$
Input Resistance	R_{IN}	Both	50	—	k Ω	$V_{DD} = 12V$
			50	—		$V_{DD} = 10V$
			50	—		$V_{DD} = 5.0V$

MIC5821/22

ELECTRICAL CHARACTERISTICS (CONTINUED)

$T_A = +25^\circ\text{C}$ $V_{DD} = 5\text{V}$, $V_{EE} = V_{SS} = 0\text{V}$ (unless otherwise specified) (Note 1)

Parameter	Symbol	Applicable Devices	Min.	Max.	Units	Conditions
Supply Current	$I_{DD(ON)}$	Both	—	4.5	mA	One Driver ON, $V_{DD} = 12\text{V}$
			—	3.9		One Driver ON, $V_{DD} = 10\text{V}$
			—	2.4		One Driver ON, $V_{DD} = 5.0\text{V}$
			—	16		All Drivers ON, $V_{DD} = 12\text{V}$
			—	14		All Drivers ON, $V_{DD} = 10\text{V}$
			—	8		All Drivers ON, $V_{DD} = 5.0\text{V}$
	$I_{DD(OFF)}$	Both	—	1.6		All Drivers OFF, $V_{DD} = 5.0\text{V}$
			—	2.9		All Drivers OFF, $V_{DD} = 12\text{V}$
			—	2.9		All Drivers OFF, $V_{DD} = 12\text{V}$

Note 1: Specification for packaged product only.

ELECTRICAL CHARACTERISTICS

$T_A = -55^\circ\text{C}$ $V_{DD} = 5\text{V}$, $V_{EE} = V_{SS} = 0\text{V}$ (unless otherwise specified) (Note 1)

Parameter	Symbol	Min.	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	$I_{DD(ON)}$	—	5.5	mA	One Driver ON, $V_{DD} = 12\text{V}$
		—	4.5		One Driver ON, $V_{DD} = 10\text{V}$
		—	3.0		One Driver ON, $V_{DD} = 5.0\text{V}$
		—	16		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, $V_{DD} = 5.0\text{V}$
		—	2.0		All Drivers OFF, $V_{DD} = 5.0\text{V}$

Note 1: Specification for packaged product only.

ELECTRICAL CHARACTERISTICS

$T_A = +125^\circ\text{C}$ $V_{DD} = 5\text{V}$, $V_{EE} = V_{SS} = 0\text{V}$ (unless otherwise specified) (Note 1)

Parameter	Symbol	Min.	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	—	k Ω	$V_{DD} = 12\text{V}$
		50	—		$V_{DD} = 10\text{V}$
		50	—		$V_{DD} = 5.0\text{V}$
Supply Current	$I_{DD(ON)}$	—	4.5	mA	One Driver ON, $V_{DD} = 12\text{V}$
		—	3.9		One Driver ON, $V_{DD} = 10\text{V}$
		—	2.4		One Driver ON, $V_{DD} = 5.0\text{V}$
		—	16		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, $V_{DD} = 5.0\text{V}$

Note 1: Specification for packaged product only.

TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Operating Temperature Range	T_A	−55	—	+85	$^\circ\text{C}$	—
Storage Temperature Range	T_S	−65	—	+150	$^\circ\text{C}$	—

MAXIMUM ALLOWABLE DUTY CYCLE

Number of Outputs ON ($I_{OUT} = 200\text{ mA}$ $V_{DD} = 12\text{V}$)	Maximum Allowable Duty Cycle at Ambient Temperature of				
	25 $^\circ\text{C}$	40 $^\circ\text{C}$	50 $^\circ\text{C}$	60 $^\circ\text{C}$	70 $^\circ\text{C}$
8	73%	62%	55%	47%	40%
7	83%	71%	62%	54%	46%
6	97%	82%	72%	63%	53%
5	100%	98%	87%	75%	63%
4	100%	100%	100%	93%	79%
3	100%	100%	100%	100%	100%
2	100%	100%	100%	100%	100%
1	100%	100%	100%	100%	100%

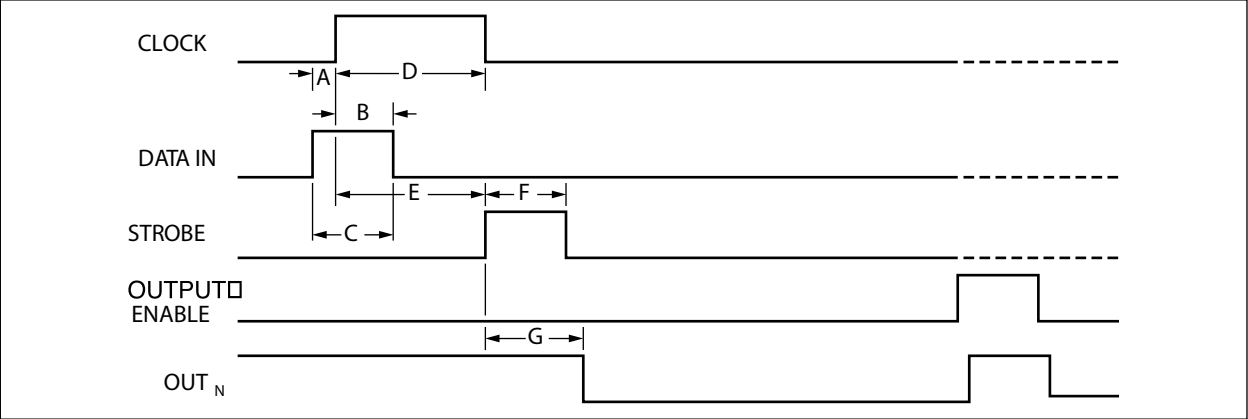
MIC5821/22

TRUTH TABLE

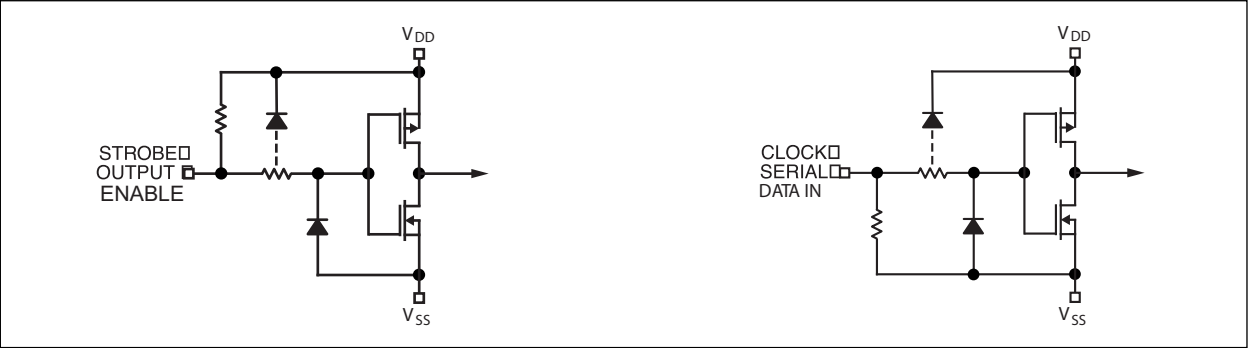
Serial Data Input	Clock Input	Shift Register Contents						Serial Data Output	Strobe Input	Latch Contents						Output Enable	Output Contents					
		I ₁	I ₂	I ₃	.....	I ₈				L ₁	L ₂	L ₃	.....	L ₈			O ₁	O ₂	O ₃	.....	O ₈	
H	┐	H	R ₁	R ₂	.....	R ₇		R ₇	—	—						—	—					
L	┐	L	R ₁	R ₂	.....	R ₇		R ₇														
X	┐	R ₁	R ₂	R ₃	.....	R ₈		R ₈														
—	—	X	X	X	.....	X		X	L	R ₁	R ₂	R ₃	.....	R ₈		L	P ₁	P ₂	P ₃	.....	P ₈	
		P ₁	P ₂	P ₃	.....	P ₈		P ₈	H	P ₁	P ₂	P ₃	.....	P ₈			P ₁	P ₂	P ₃	.....	P ₈	
		—	—	—	.....	—		—	—	X	X	X	.....	X			H	H	H	.....	H	

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

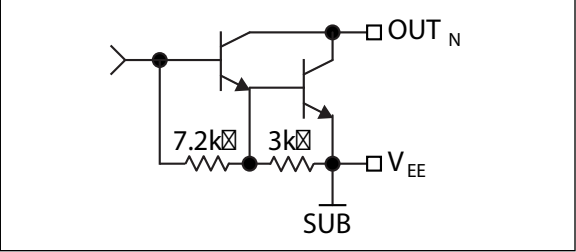
Timing Diagram



Typical Input Circuits



Typical Output Driver



2.0 TIMING CONDITIONS

($T_A = +25^\circ\text{C}$, Logic Levels are V_{DD} and V_{SS})

$V_{DD} = 5.0\text{V}$

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 entry.

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

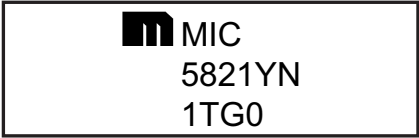
3.0 PACKAGING INFORMATION

3.1 Package Marking Information

16-Lead PDIP*



Example



Legend:

XX...X	Product code or customer-specific information
Y	Year code (last digit of calendar year)
YY	Year code (last 2 digits of calendar year)
WW	Week code (week of January 1 is week '01')
NNN	Alphanumeric traceability code
(e3)	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).

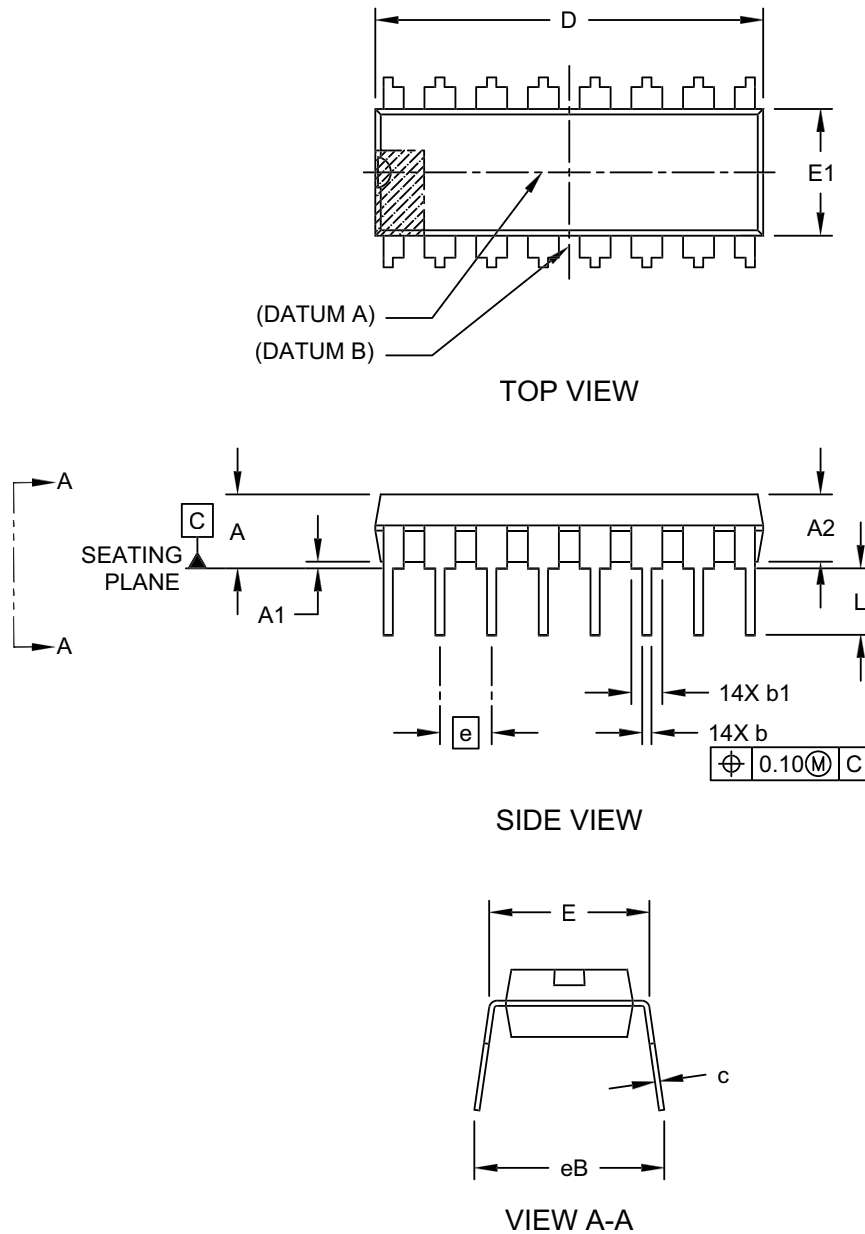
Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for customer-specific information. Package may or may not include the corporate logo.

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

16-Lead Plastic Dual In-Line (D6X) - 300 mil Body [PDIP]

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

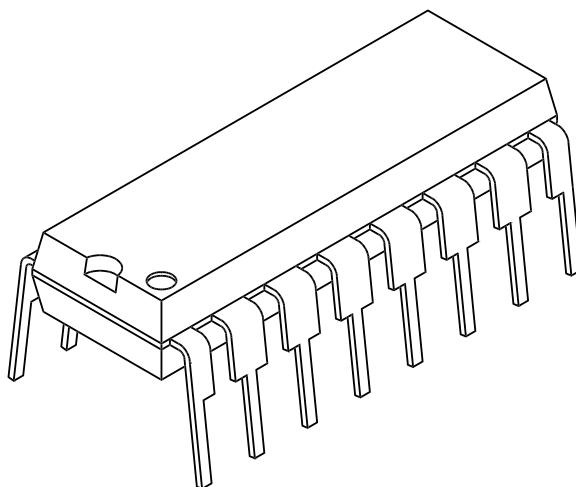


Microchip Technology Drawing C04-00017 Rev C (D6X) Sheet 1 of 2

MIC5821/22

16-Lead Plastic Dual In-Line (D6X) - 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		16		
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		.290	.310	.325
Molded Package Width	E1		.240	.250	.280
Overall Length	D		.735	.750	.775
Tip to Seating Plane	L		.115	.130	.150
Lead Thickness	c		.008	.010	.015
Upper Lead Width	b1		.045	.060	.070
Lower Lead Width	b		.014	.018	.022
Overall Row Spacing	§	eB	-	-	.430

Notes:

1. Pin 1 visual index feature may vary, but must be located within the hatched area.
2. § Significant Characteristic
3. Dimensions D and E do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .005" per side.
4. Dimensioning and tolerancing per ASME Y14.5M

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

Microchip Technology Drawing C04-00017 Rev C (D6X) Sheet 2 of 2

APPENDIX A: REVISION HISTORY

Revision A (October 2025)

- Converted Micrel document MIC5821/22 to Microchip data sheet DS20007055A.
- Minor text changes throughout.

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:	MIC5821: MIC5822:	8-Bit Serial-Input Latched Driver (50V _{OUT}) 8-Bit Serial-Input Latched Driver (80V _{OUT})		a) MIC5821YN: MIC5821, -40°C to +85°C Temp. Range, 16-Lead PDIP, 25/Tube
Temperature Range:	Y	=	-40°C to +85°C	a) MIC5822YN: MIC5822, -40°C to +85°C Temp. Range, 16-Lead PDIP, 25/Tube
Package:	N	=	16-Lead PDIP	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.
Media Type:	<blank>	=	25/Tube	

NOTES:

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