

High- or Low-Side MOSFET Drivers

Features

- 2.75V to 30V Operation
- 100 μ A Maximum Supply Current (5V Supply)
- 15 μ A Typical Off-State Current
- Internal Charge Pump
- TTL-Compatible Input
- Withstands 60V Transient (Load Dump)
- Reverse Battery Protection to -20 V
- Inductive Spike Protection to -20 V
- Overvoltage Shutdown at 35V
- Internal 15V Gate Protection
- Minimum External Parts
- Operates in High-Side or Low-Side Configurations
- 1 μ A Control Input Pull-Off
- Inverting and Non-Inverting Versions

Applications

- Automotive Electrical Load Control
- Battery-Powered Computer Power Management
- Lamp Control
- Heater Control
- Motor Control
- Power Bus Switching

General Description

The MIC5014 and MIC5015 MOSFET drivers are designed for gate control of N-channel, enhancement-mode, power MOSFETs used as high-side or low-side switches. The MIC5014/5 can sustain an on-state output indefinitely.

The MIC5014/5 operate from a 2.75V to 30V supply. In high-side configurations, the driver can control MOSFETs that switch loads of up to 30V. In low-side configurations, with separate supplies, the maximum switched voltage is limited only by the MOSFET.

The MIC5014/5 have a TTL-compatible control input. The MIC5014 is non-inverting, while the MIC5015 is inverting.

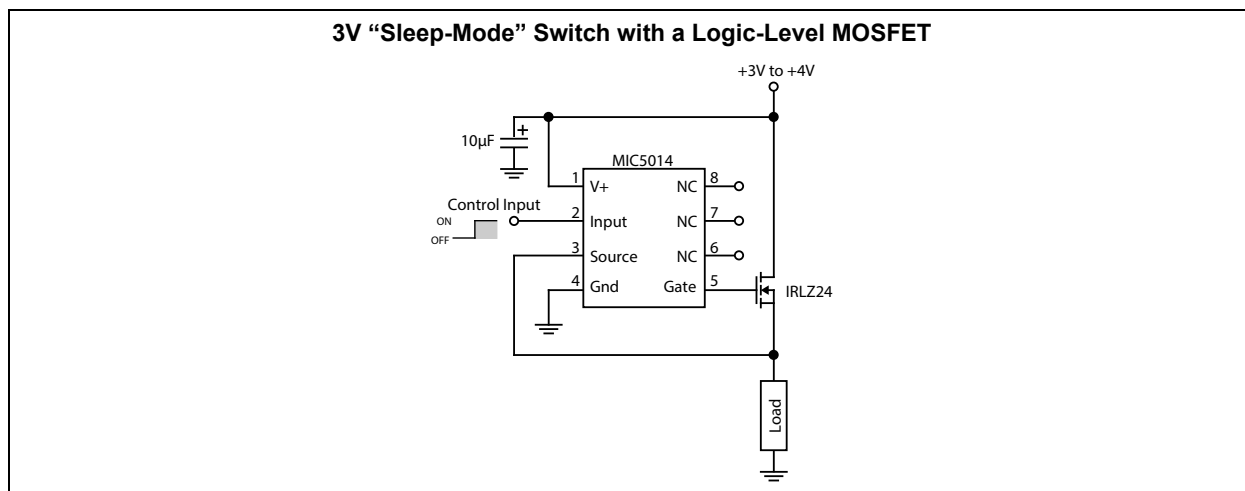
The MIC5014/5 feature an internal charge pump that can sustain a gate voltage greater than the available supply voltage. The driver is capable of turning on a logic-level MOSFET from a 2.75V supply or a standard MOSFET from a 5V supply. The gate-to-source output voltage is internally limited to approximately 15V.

The MIC5014/5 is protected against automotive load dump, reversed battery, and inductive load spikes of -20 V. The driver's overvoltage shutdown feature turns off the external MOSFET at approximately 35V to protect the load against power supply excursions.

The MIC5014 is an improved pin-for-pin compatible replacement in many MIC5011 applications.

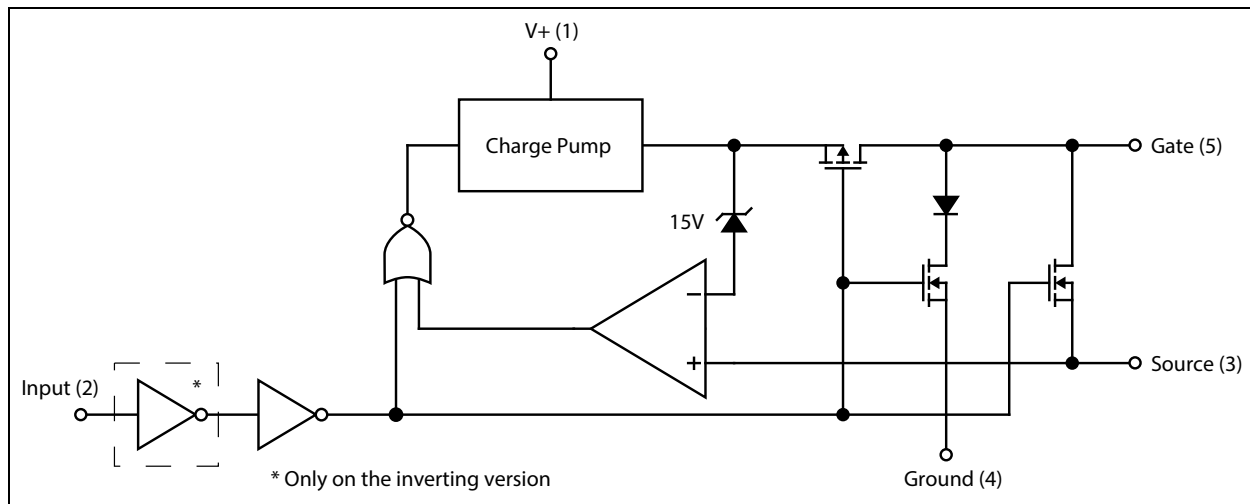
The MIC5014/5 is available in plastic 8-pin DIP and 8-pin SOIC packages.

Typical Application Circuit



MIC5014/5

Functional Block Diagram



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings †

Supply Voltage	–20V to +60V
Input Voltage	–20V to V^+
Source Voltage.....	–20V to V^+
Source Current.....	50 mA
Gate Voltage	–20V to +50V

Operating Ratings ‡

Supply Voltage (V^+).....	+2.75V to +30V
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† **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.

‡ **Notice:** The device is not guaranteed to function outside its operating ratings. The MIC5014/5 are ESD sensitive.

ELECTRICAL CHARACTERISTICS

Electrical Characteristics: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, unless noted. [Note 1](#)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions	
Supply Current		—	10	25	μA	$V^+ = 30\text{V}$	V_{IN} deasserted, Note 3
		—	5.0	10	mA		V_{IN} asserted, Note 3
		—	10	25	μA	$V^+ = 5\text{V}$	V_{IN} deasserted
		—	60	100			V_{IN} asserted
		—	10	25	μA	$V^+ = 3\text{V}$	V_{IN} deasserted
		—	25	35			V_{IN} asserted
Logic Input Voltage Threshold	V_{IN}	—	—	0.8	V	$3.0\text{V} \leq V^+ \leq 30\text{V}$ $T_A = 25^{\circ}\text{C}$	Digital low level
		2.0	—	—			Digital high level
Logic Input Current MIC5014 (Non-Inverting)		–2.0	0	—	μA	$3.0\text{V} \leq V^+ \leq 30\text{V}$	V_{IN} low
		—	1.0	2.0			V_{IN} high
Logic Input Current MIC5015 (Inverting)		–2.0	–1.0	—	μA	$3.0\text{V} \leq V^+ \leq 30\text{V}$	V_{IN} low
		—	–1.0	2.0			V_{IN} high
Input Capacitance	C_{IN}	—	5.0	—	pF	—	
Gate Enhancement $V_{\text{GATE}} - V_{\text{SUPPLY}}$		4.0	—	17	V	$3.0\text{V} \leq V^+ \leq 30\text{V}$	V_{IN} asserted
Zener Clamp $V_{\text{GATE}} - V_{\text{SOURCE}}$		13	15	17	V	$8.0\text{V} \leq V^+ \leq 30\text{V}$	V_{IN} asserted
Gate Turn-On Time, Note 2	t_{ON}	—	2.5	8.0	ms	$V^+ = 4.5\text{V}$ $C_L = 1000\text{ pF}$	V_{IN} switched on, measure time for V_{GATE} to reach $V^+ + 4\text{V}$
		—	90	140	μs	$V^+ = 12\text{V}$ $C_L = 1000\text{ pF}$	V_{IN} switched on, measure time for V_{GATE} to reach $V^+ + 4\text{V}$

MIC5014/5

ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Characteristics: $T_A = -40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$, unless noted. [Note 1](#)

Parameter	Symbol	Min.	Typ.	Max.	Units	Conditions	
Gate Turn-Off Time, Note 2	t_{OFF}	—	6.0	30	μs	$V^+ = 4.5\text{V}$ $C_L = 1000\text{ pF}$	V_{IN} switched on, measure time for V_{GATE} to reach 1V
		—	6.0	30		$V^+ = 12\text{V}$ $C_L = 1000\text{ pF}$	V_{IN} switched on, measure time for V_{GATE} to reach 1V
Overvoltage Shutdown Threshold		35	37	41	V	—	

Note 1: Minimum and maximum Electrical Characteristics are 100% tested at $T_A = 25^{\circ}\text{C}$ and $T_A = 85^{\circ}\text{C}$, and 100% guaranteed over the entire operating temperature range. Typical values are characterized at 25°C and represent the most likely parametric norm.

2: Test conditions reflect worst case high-side driver performance. Low-side and bootstrapped topologies are significantly faster. See the [Application Information](#) section.

3: “Asserted” refers to a logic high on the MIC5014 and a logic low on the MIC5015.

TEMPERATURE SPECIFICATIONS

Parameters	Sym.	Min.	Typ.	Max.	Units	Conditions
Temperature Ranges						
Maximum Junction Temperature	$T_{\text{J(MAX)}}$	—	—	+150	$^{\circ}\text{C}$	—
Ambient Operating Temperature Range	T_A	−40	—	+85	$^{\circ}\text{C}$	—
Storage Temperature	T_S	−65	—	+150	$^{\circ}\text{C}$	—
Lead Temperature	T_{LEAD}	—	—	+260	$^{\circ}\text{C}$	Soldering, 10 sec.
Package Thermal Resistances						
Thermal Resistance, PDIP 8-Ld	θ_{JA}	—	160	—	$^{\circ}\text{C/W}$	—
Thermal Resistance, SOIC 8-Ld	θ_{JA}	—	170	—	$^{\circ}\text{C/W}$	—

2.0 TYPICAL PERFORMANCE CURVES

Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

All data measured using FET probe to minimize resistive loading.

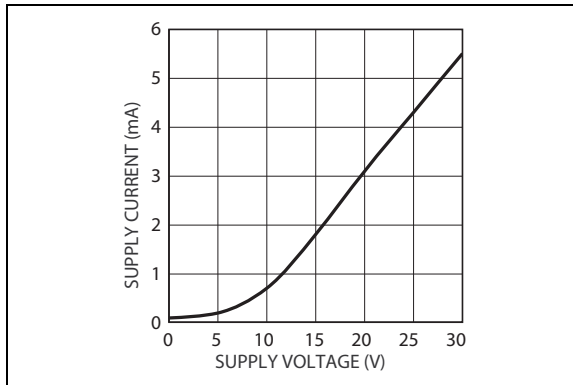


FIGURE 2-1: Supply Current (Output Asserted).

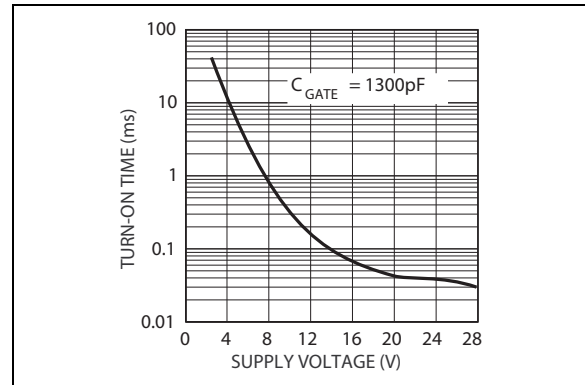


FIGURE 2-4: High-Side Turn-On Time Until Gate Supply Equals Supply + 4V.

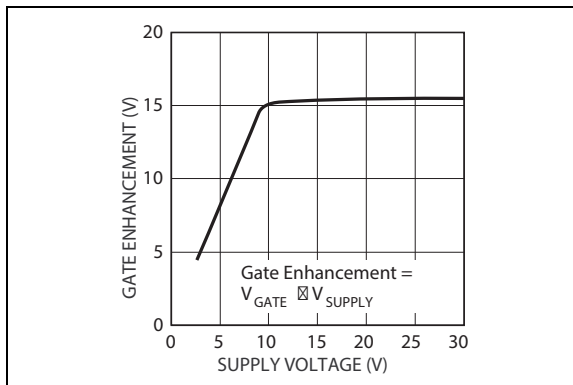


FIGURE 2-2: Gate Enhancement vs. Supply Voltage.

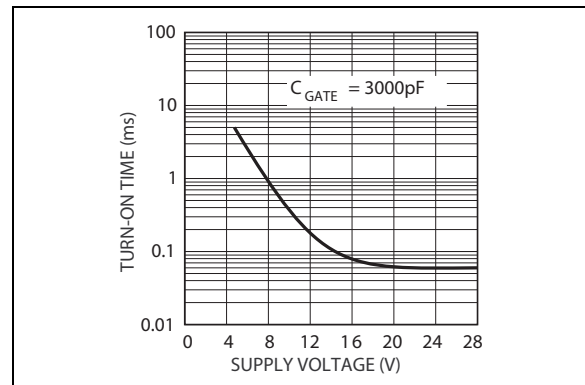


FIGURE 2-5: High-Side Turn-On Time Until Gate Supply Equals Supply + 4V.

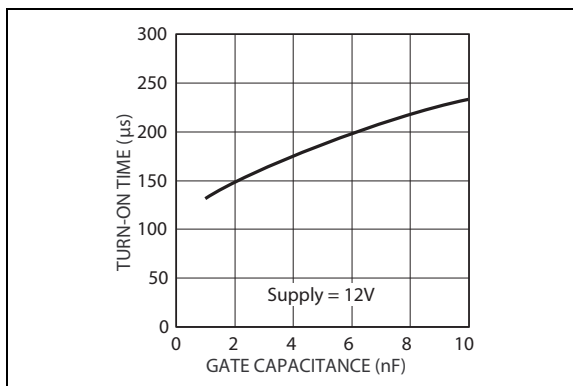


FIGURE 2-3: High-Side Turn-On Time vs. Gate Capacitance.

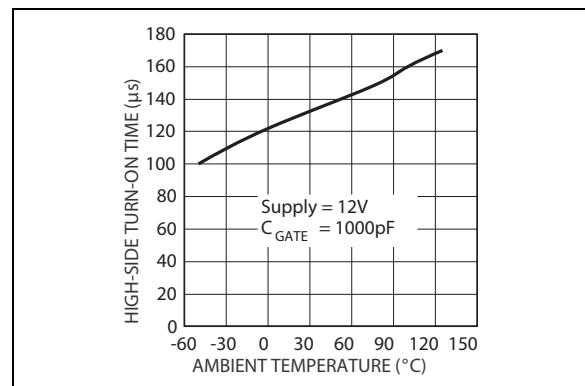


FIGURE 2-6: High-Side Turn-On Time vs. Temperature.

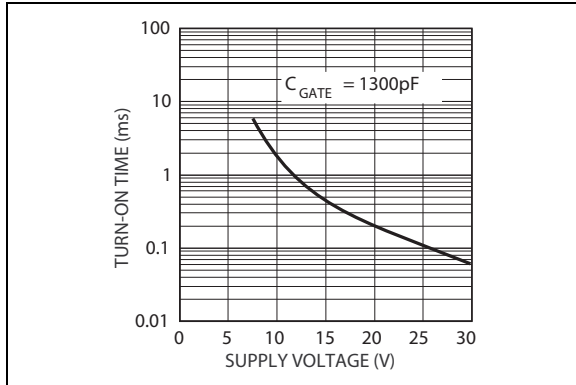


FIGURE 2-7: High-Side Turn-On Time Until Gate Supply Equals Supply + 10V.

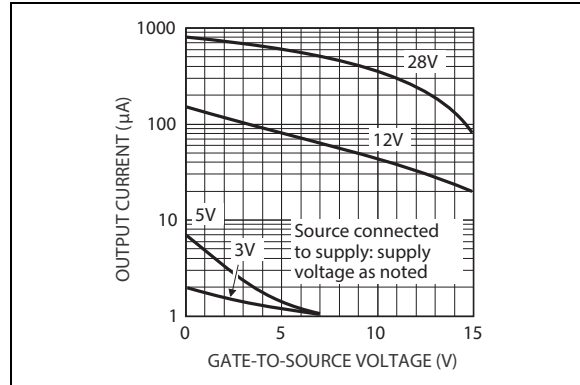


FIGURE 2-10: Charge-Pump Output Current.

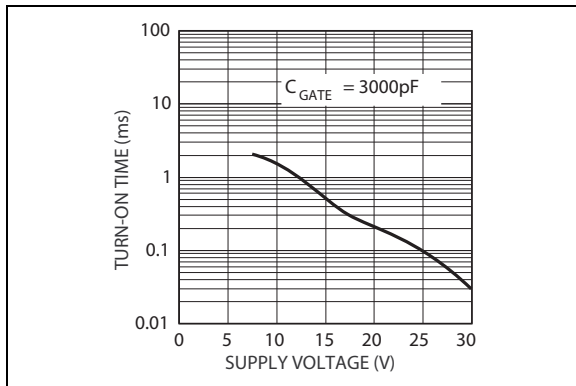


FIGURE 2-8: High-Side Turn-On Time Until Gate Supply Equals Supply + 10V.

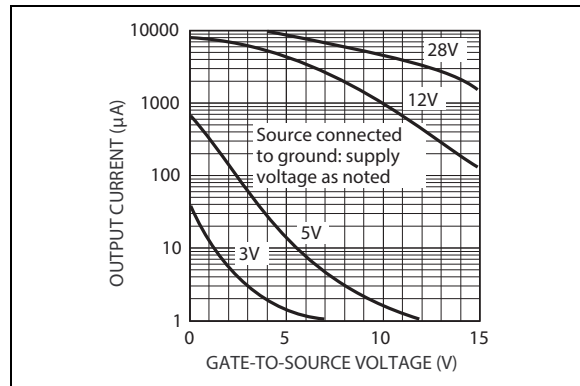


FIGURE 2-11: Charge-Pump Output Current.

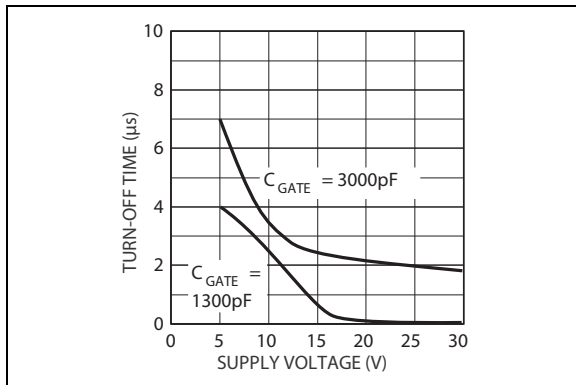


FIGURE 2-9: High-Side Turn-Off Time Until Gate Equals 1V.

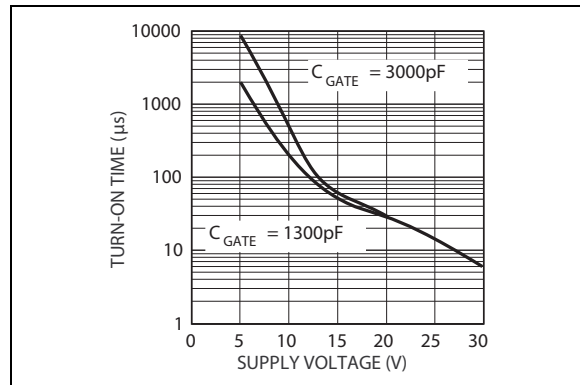


FIGURE 2-12: Low-Side Turn-On Time Until Gate Equals 4V.

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in [Table 3-1](#).

TABLE 3-1: PIN FUNCTION TABLE

Pin Number	Pin Name	Description
1	V ⁺	Supply. Must be decoupled to isolate from large transients caused by the power MOSFET drain. 10 μ F is recommended close to Pins 1 and 4.
2	Input	Turns on power MOSFET when taken above (or below) threshold (1.0V typical). Pin 2 requires $\sim$ 1 μ A to switch.
3	Source	Connects to source lead of power MOSFET and is the return for the gate clamp zener. Pin 3 can safely swing to -20 V when turning off inductive loads.
4	Ground	Ground.
5	Gate	Drives and clamps the gate of the power MOSFET.
6, 7, 8	NC	Not internally connected.

4.0 APPLICATION INFORMATION

4.1 Functional Description

The MIC5014 is functionally and pin-for-pin compatible with the MIC5011, except for the omission of the optional speedup capacitor pins, which are available on the MIC5011. The MIC5015 is an inverting configuration of the MIC5014.

The internal functions of these devices are controlled via a logic block (refer to the [Functional Block Diagram](#)) connected to the control input (Pin 2). When the input is off (low for the MIC5014, and high for the MIC5015), all functions are turned off, and the gate of the external power MOSFET is held low via two N-channel switches. This results in a very low standby current; 15 μ A typical, which is necessary to power an internal bandgap. When the input is driven to the "ON" state, the N-channel switches are turned off, the charge pump is turned on, and the P-channel switch between the charge pump and the gate turns on, allowing the gate of the power FET to be charged. The op amp and internal zener form an active regulator that shuts off the charge pump when the gate voltage is high enough. This is a feature not found on the MIC5011.

The charge pump incorporates a 100 kHz oscillator and on-chip pump capacitors capable of charging a 1,000 pF load in 90 μ s typical. In addition to providing active regulation, the internal 15V zener is included to prevent exceeding the V_{GS} rating of the power MOSFET at high supply voltages.

The MIC5014/5 devices have been improved for greater ruggedness and durability. All pins can withstand being pulled 20V below ground without sustaining damage, and the supply pin can withstand an overvoltage transient of 60V for 1 second. An overvoltage shutdown has also been included, which turns off the device when the supply exceeds 35V.

4.2 Construction Hints

High current pulse circuits demand equipment and assembly techniques that are more stringent than normal, low current lab practices. The following are the sources of pitfalls most often encountered during prototyping:

Supplies: Many bench power supplies have poor transient response. Circuits that are being pulse tested, or those that operate by pulse-width modulation will produce strange results when used with a supply that has poor ripple rejection, or a peaked transient response. Always monitor the power supply voltage that appears at the drain of a high-side driver (or the supply side of the load for a low-side driver) with an oscilloscope. It is not uncommon to find bench power supplies in the 1 kW class that overshoot or undershoot by as much as 50% when pulse loaded. Not only will the load current and voltage measurements be

affected, but it is possible to over stress various components, especially electrolytic capacitors, with possibly catastrophic results. A 10 μ F supply bypass capacitor at the chip is recommended.

Residual Resistances: Resistances in circuit connections may also cause confusing results. For example, a circuit may employ a 50 m Ω power MOSFET for low voltage drop, but unless careful construction techniques are used, one could easily add 50 m Ω to 100 m Ω resistance. Do not use a socket for the MOSFET. If the MOSFET is a TO-220 type package, make high current connections to the drain tab. Wiring losses have a profound effect on high-current circuits. A floating milliohmeter can identify connections that are contributing excess drop under load.

4.3 Low Voltage Testing

As the MIC5014/5 have relatively high output impedances, a normal oscilloscope probe will load the device. This is especially pronounced at low voltage operation. It is recommended that a FET probe or unity gain buffer be used for all testing.

4.4 Circuit Topologies

The MIC5014 and MIC5015 are well suited for use with standard power MOSFETs in both low- and high-side driver configurations. In addition, the lowered supply voltage requirements of these devices make them ideal for use with logic level FETs in high-side applications with a supply voltage of 3V to 4V. (If higher supply voltages [>4 V] are used with logic level FETs, an external zener clamp must be supplied to ensure that the maximum V_{GS} rating of the logic FET [10V] is not exceeded.) In addition, a standard IGBT can be driven using these devices.

Choice of one topology over another is usually based on speed vs. safety. The fastest topology is the low side driver, however, it is not usually considered as safe as high-side driving as it is easier to accidentally short a load to ground than to V_{CC} . The slowest, but safest topology is the high-side driver; with speed being inversely proportional to supply voltage. It is the preferred topology for most military and automotive applications. Speed can be improved considerably by bootstrapping from the supply.

All topologies implemented using these devices are well suited to driving inductive loads, as either the gate or the source pin can be pulled 20V below ground with no effect. External clamp diodes are unnecessary, except for the case in which a transient may exceed the overvoltage trip point.

High-Side Driver ([Typical Application Circuit](#)) The high-side topology shown here is an implementation of a "sleep-mode" switch for a laptop or notebook

MIC5014/5

High-Side Driver With Delayed Current Sense (Figure 4-4) Delay of the overcurrent detection to accommodate high inrush loads such as incandescent or halogen lamps can be accomplished by adding an LM3905 timer as a one shot to provide an open collector pull-down for the comparator output such that the control input of the MIC5015 stays low for a preset amount of time without interference from the current sense circuitry. Note that an MIC5015 must be used in this application (Figure 4-4), as an inverting control input is necessary. The delay time is set by the RC time constant of the external components on Pins 3 and 4 of the timer; in this case, 6 ms was chosen.

An LM3905 timer was used instead of a 555 as it provides a clean transition, and is almost impossible to make oscillate. Good bypassing and noise immunity is essential in this circuit to prevent spurious op amp oscillations.

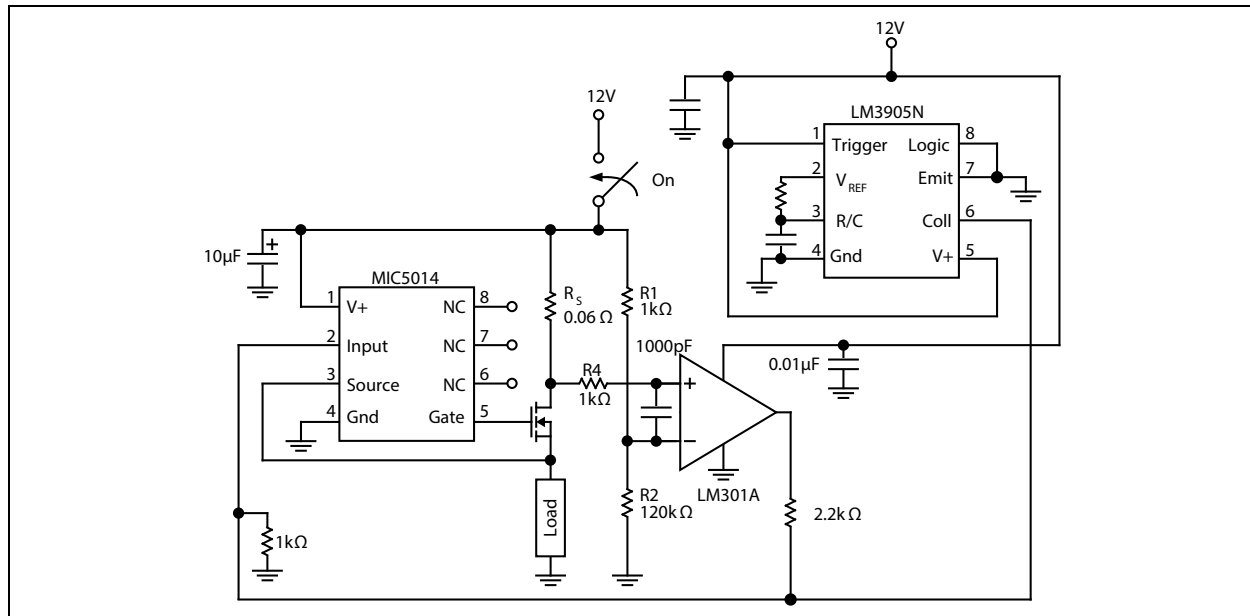


FIGURE 4-4: High-Side Driver with Delayed Overcurrent Shutdown.

4.5 Typical Applications

Variable Supply Low-Side Driver for Motor Speed Control (Figure 4-5) The internal regulation in the MIC5014/5 allows a steady gate enhancement to be supplied while the MIC5014/5 supply varies from 5V to 30V, without damaging the internal gate to source zener clamp. This allows the speed of the DC motor shown to be varied by varying the supply voltage.

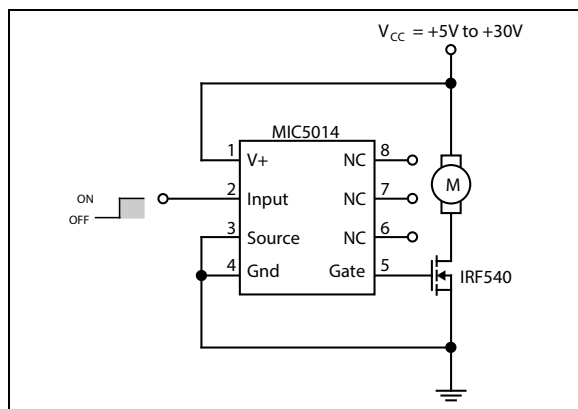


FIGURE 4-5: DC Motor Speed Control/Driver.

Solenoid Valve Driver (Figure 4-6) High power solenoid valves are used in many industrial applications requiring the timed dispensing of chemicals or gases. When the solenoid is activated, the valve opens (or closes), releasing (or stopping) fluid flow. A solenoid valve, like all inductive loads, has a considerable “kickback” voltage when turned off, as current cannot change instantaneously through an inductor. In most applications, it is acceptable to allow this voltage to momentarily turn the MOSFET back on as a way of dissipating the inductor’s current. However, if this occurs when driving a solenoid valve with a fast switching speed, chemicals, or gases may be inadvertently be dispensed at the wrong time with possibly disastrous consequences. Also, too large of a kickback voltage (as is found in larger solenoids) can damage the MIC5014 or the power FET by forcing the Source node below ground (the MIC5014 can be driven up to 20V below ground before this happens). A catch diode has been included in this design to provide an alternate route for the inductive kickback current to flow. The 5 kΩ resistor in series with this diode has been included to set the recovery time of the solenoid valve.

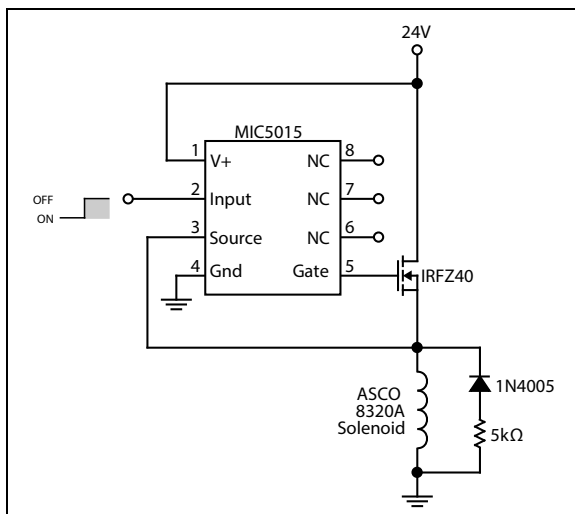


FIGURE 4-6: Solenoid Valve Driver.

Incandescent/Halogen Lamp Driver (Figure 4-7) The combination of an MIC5014/5 and a power FET makes an effective driver for a standard incandescent or halogen lamp load. Such loads often have high inrush currents, as the resistance of a cold filament is less than one-tenth as much as when it is hot. Power MOSFETs are well suited to this application as they have wider safe operating areas than do power bipolar transistors. It is important to check the SOA curve on the data sheet of the power FET to be used against the estimated or measured inrush current of the lamp in question prior to prototyping to prevent “explosive” results.

If overcurrent sense is to be used, first measure the duration of the inrush, then use the topology of Figure 4-4 with the RC of the timer chosen to accommodate the duration with suitable guardbanding.

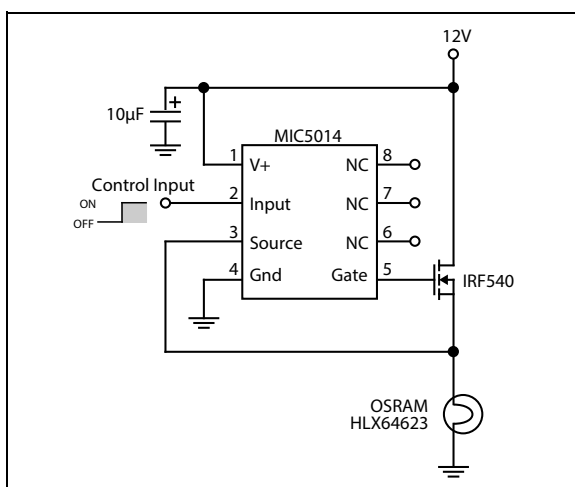


FIGURE 4-7: Halogen Lamp Driver.

Relay Driver (Figure 4-8) Some power relay applications require the use of a separate switch or drive control, such as in the case of microprocessor control of banks of relays where a logic level control signal is used, or for drive of relays with high power requirements. The combination of an MIC5014/5 and a power FET also provides an elegant solution to power relay drive.

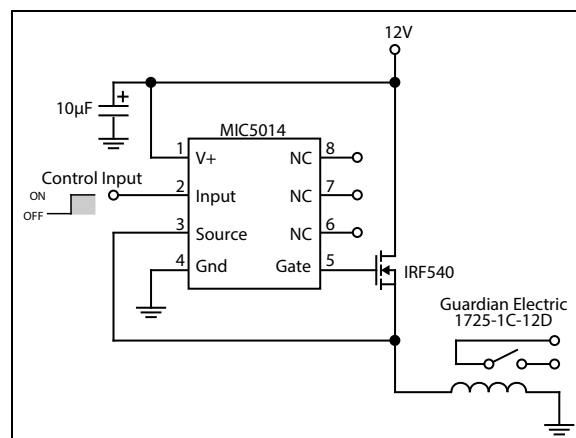


FIGURE 4-8: Relay Driver.

Motor Driver With Stall Shutdown (Figure 4-9) Tachometer feedback can be used to shut down a motor driver circuit when a stall condition occurs. The control switch is a 3-way type; the “START” position is momentary and forces the driver ON. When released, the switch returns to the “RUN” position, and the tachometer’s output is used to hold the MIC5014 input ON. If the motor slows down, the tachometer output is reduced, and the MIC5014 switches OFF. Resistor “R” sets the shutdown threshold.

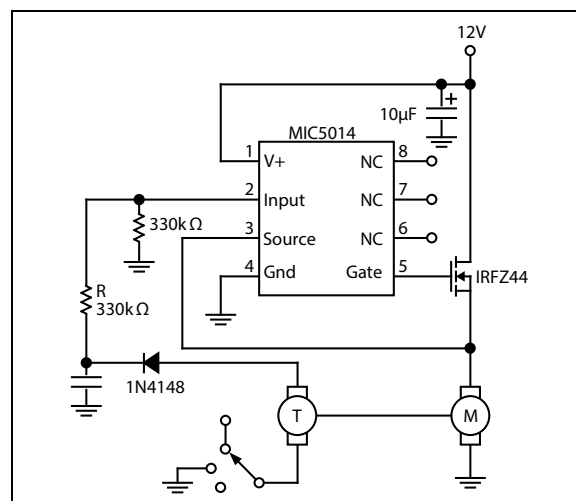


FIGURE 4-9: Motor Stall Shutdown.

MIC5014/5

Simple DC-DC Converter (Figure 4-10) The simplest application for the MIC5014 is as a basic one-chip DC-DC converter. As the output (Gate) pin has a relatively high impedance, the output voltage shown will vary significantly with applied load.

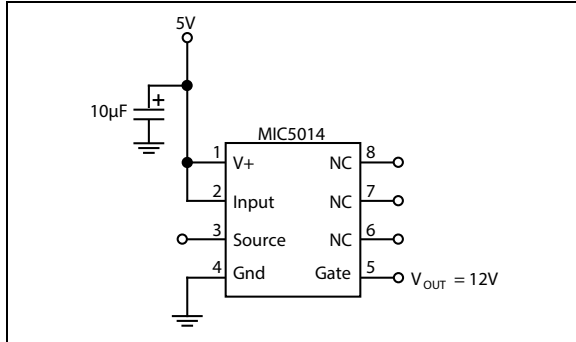


FIGURE 4-10: DC-DC Converter.

High-Side Driver With Load Protection (Figure 4-11) Although the MIC5014/5 devices are reverse battery protected, the load and power FET are not, in a typical high-side configuration. In the event of a reverse battery condition, the internal body diode of the power FET will be forward biased. This allows the reversed supply access to the load.

The addition of a Schottky diode between the supply and the FET eliminates this problem. The MBR2035CT was chosen as it can withstand 20A continuous and 150A peak, and should survive the rigors of an automotive environment. The two diodes are paralleled to reduce switch loss (forward voltage drop).

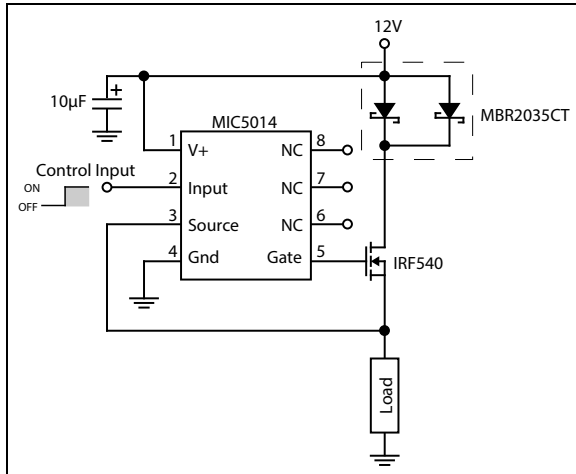


FIGURE 4-11: High-Side Driver with Load Protection.

Push-Pull Driver With No Cross-Conduction (Figure 4-12) As the turn-off time of the MIC5014/5 devices is much faster than the turn-on time, a simple push-pull driver with no cross conduction can be made using one MIC5014 and one MIC5015. The same control signal is applied to both inputs; the MIC5014 turns on with the positive signal, and the MIC5015 turns on when it swings low.

This scheme works with no additional components as the relative time difference between the rise and fall times of the MIC5014 is large. However, this does mean that there is considerable dead-time (time when neither driver is turned on). If this circuit is used to drive an inductive load, catch diodes must be used on each half to provide an alternate path for the kickback current that will flow during this dead-time.

This circuit is also a simple half H-bridge which can be driven with a PWM signal on the input for SMPS or motor drive applications in which high switching frequencies are not desired.

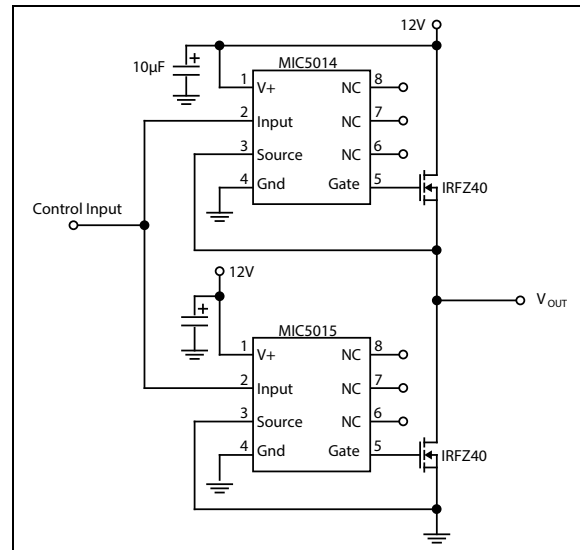
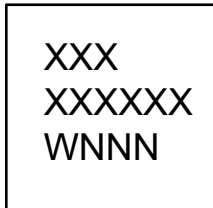


FIGURE 4-12: Push-Pull Driver.

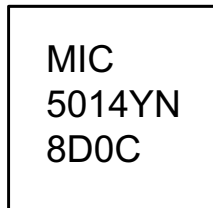
5.0 PACKAGING INFORMATION

5.1 Package Marking Information

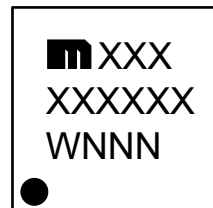
8-Lead PDIP*



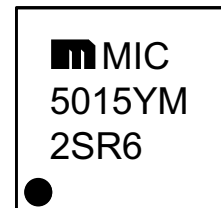
Example



8-Lead SOIC*



Example



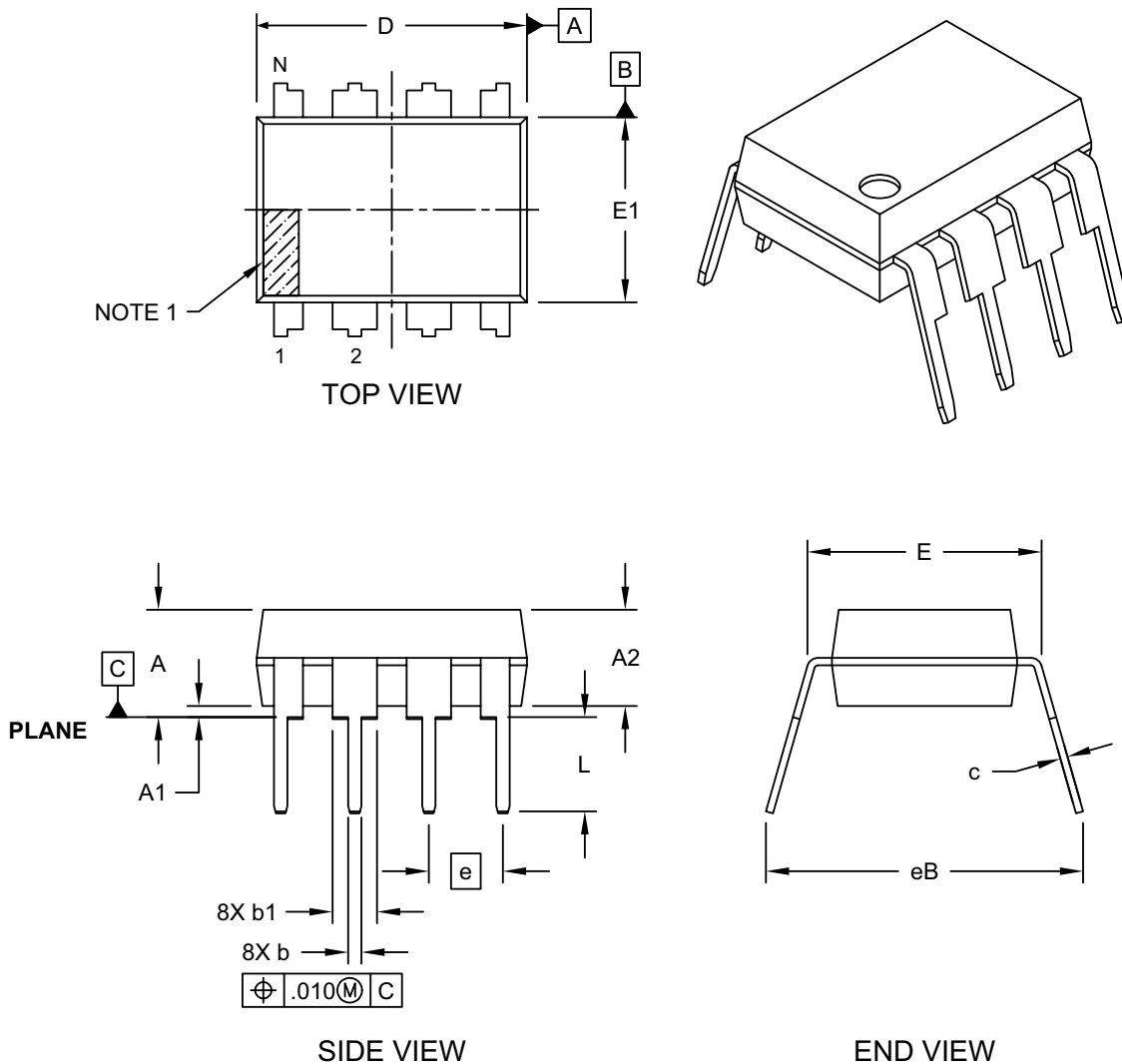
Legend:	XX...X	Product code or customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package 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 (_) 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 = YYWWNNN; 5 Characters = WWNNN; 4 Characters = WNNN; 3 Characters = NNN;
 2 Characters = NN; 1 Character = N

MIC5014/5

8-Lead Plastic Dual In-Line (PA) - 300 mil Body [PDIP]

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

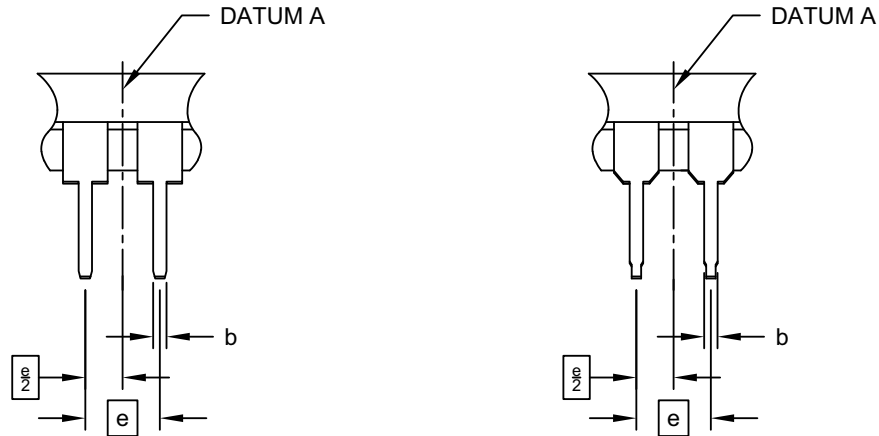


Microchip Technology Drawing No. C04-018-PA Rev F Sheet 1 of 2

8-Lead Plastic Dual In-Line (PA) - 300 mil Body [PDIP]

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

ALTERNATE LEAD DESIGN (NOTE 5)



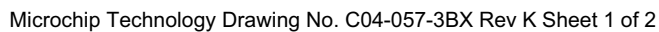
Units		INCHES		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	8		
Pitch	e	.100 BSC		
Top to Seating Plane	A	-	-	.210
Molded Package Thickness	A2	.115	.130	.195
Base to Seating Plane	A1	.015	-	-
Shoulder to Shoulder Width	E	.290	.310	.325
Molded Package Width	E1	.240	.250	.280
Overall Length	D	.348	.365	.400
Tip to Seating Plane	L	.115	.130	.150
Lead Thickness	c	.008	.010	.015
Upper Lead Width	b1	.040	.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.
- Lead design above seating plane may vary, based on assembly vendor.

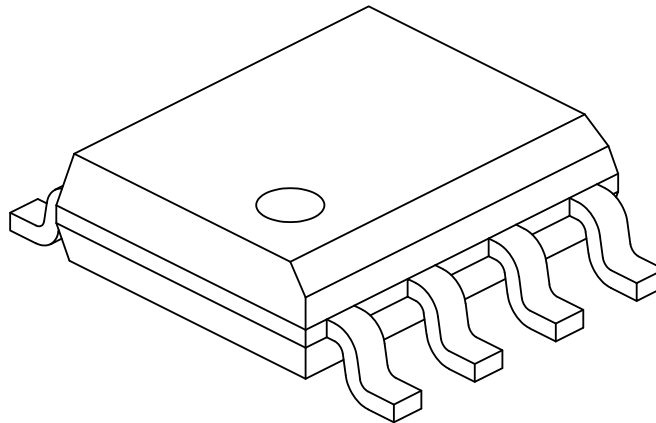
Microchip Technology Drawing No. C04-018-PA Rev F Sheet 2 of 2

Note: For the most current package drawings, please see the Microchip Packaging Specification located at <http://www.microchip.com/package3>



8-Lead Plastic Small Outline (3BX) - Narrow, 3.90 mm (.150 In.) Body [SOIC] Atmel Legacy Global Package Code SWB

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



Dimension Limits	Units	MILLIMETERS		
		MIN	NOM	MAX
Number of Pins	N	8		
Pitch	e	1.27 BSC		
Overall Height	A	—	—	1.75
Molded Package Thickness	A2	1.25	—	—
Standoff §	A1	0.10	—	0.25
Overall Width	E	6.00 BSC		
Molded Package Width	E1	3.90 BSC		
Overall Length	D	4.90 BSC		
Chamfer (Optional)	h	0.25	—	0.50
Foot Length	L	0.40	—	1.27
Footprint	L1	1.04 REF		
Lead Thickness	c	0.17	—	0.25
Lead Width	b	0.31	—	0.51
Lead Bend Radius	R	0.07	—	—
Lead Bend Radius	R1	0.07	—	—
Foot Angle	θ	0°	—	8°
Mold Draft Angle	θ1	5°	—	15°
Lead Angle	θ2	0°	—	—

Notes:

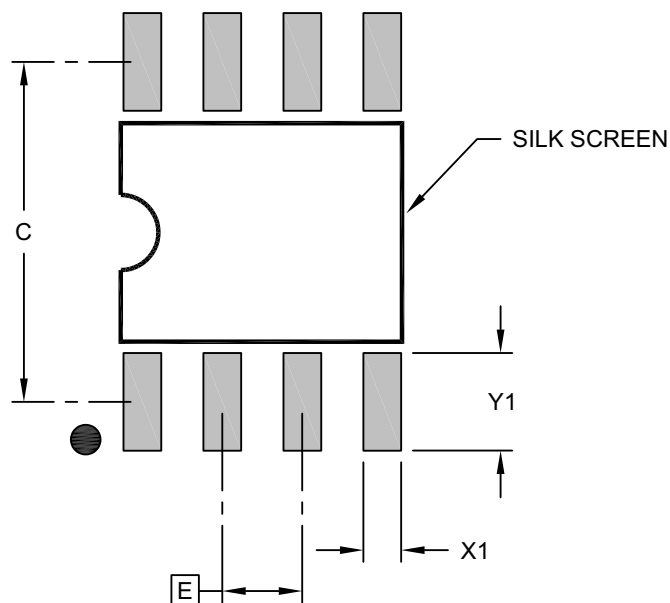
- Pin 1 visual index feature may vary, but must be located within the hatched area.
- § Significant Characteristic
- Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm per side.
- Dimensioning and tolerancing per ASME Y14.5M
 - BSC: Basic Dimension. Theoretically exact value shown without tolerances.
 - REF: Reference Dimension, usually without tolerance, for information purposes only.
- Datums A & B to be determined at Datum H.

Microchip Technology Drawing No. C04-057-3BX Rev K Sheet 2 of 2

MIC5014/5

8-Lead Plastic Small Outline (3BX) - Narrow, 3.90 mm (.150 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		5.40	
Contact Pad Width (X8)	X1			0.60
Contact Pad Length (X8)	Y1			1.55

Notes:

1. Dimensioning and tolerancing per ASME Y14.5M

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

Microchip Technology Drawing C04-2057-3BX Rev K

APPENDIX A: REVISION HISTORY

Revision A (February 2023)

- Converted Micrel document MIC5014/5 to Microchip data sheet DS20006767A.
- 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	a) MIC5014YN:	MIC5014, -40°C to +85°C Temp. Range, 8-Lead PDIP, 50/Tube
Device:	MIC5014:	High- or Low-Side Non-Inverting MOSFET Driver		b) MIC5014YM-TR:	MIC5014, -40°C to +85°C Temp. Range, 8-Lead SOIC, 2,500/Reel
	MIC5015:	High- or Low-Side Inverting MOSFET Driver		c) MIC5015YM:	MIC5015, -40°C to +85°C Temp. Range, 8-Lead SOIC, 95/Tube
Temperature Range:	Y	= -40°C to +85°C		d) MIC5015YN:	MIC5015, -40°C to +85°C Temp. Range, 8-Lead PDIP, 50/Tube
Package:	M	= 8-Lead SOIC		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 avail- ability with the Tape and Reel option.	
	N	= 8-Lead PDIP			
Media Type:	<blank>	= 50/Tube (PDIP option only)			
	<blank>	= 95/Tube (SOIC option only)			
	TR	= 2,500/Reel (SOIC option only)			

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