

## DS3658 Quad High Current Peripheral Driver

Check for Samples: [DS3658](#)

### FEATURES

- **Single Saturated Transistor Outputs**
- **Low Standby Power, 10 mW Typical**
- **High Impedance TTL Compatible Inputs**
- **Outputs May Be Tied Together for Increased Current Capacity**
- **High Output Current**
  - 600 mA Per Output
  - 2.4A Per Package
- **No Output Latch-up at 35V**
- **Low Output ON Voltage (350 mV typ @ 600 mA)**
- **High Breakdown Voltage (70V)**
- **Open Collector Outputs**
- **Output Clamp Diodes for Inductive Fly Back Protection**
- **NPN Inputs for Minimal Input Currents (1  $\mu$ A Typical)**
- **Low Operating Power**
- **Standard 5V Power Supply**
- **Power Up/Down Protection**
- **Fail Safe Operation**
- **2W Power Package**
- **Pin-for-Pin Compatible with SN75437**

### APPLICATIONS

- **Relay Drivers**
- **Lamp Drivers**
- **Solenoid Drivers**
- **Hammer Drivers**
- **Stepping Motor Drivers**
- **Triac Drivers**
- **LED Drivers**
- **High Current, High Voltage Drivers**
- **Level Translators**
- **Fiber Optic LED Drivers**

### DESCRIPTION

The DS3658 quad peripheral driver is designed for those applications where low operating power, high breakdown voltage, high output current and low output ON voltage are required. A unique input circuit combines TTL compatibility with high impedance. In fact, its extreme low input current allows it to be driven directly by a CMOS device.

The outputs are capable of sinking 600 mA each and offer a 70V breakdown. However, for inductive loads the output should be clamped to 35V or less to avoid latch-up during turn off (inductive fly back protection—refer to AN-213 '[SNOA610](#)'). An on-chip clamp diode capable of handling 800 mA is provided at each output for this purpose. In addition, the DS3658 incorporates circuitry that specifies glitch-free power up or down operation and a fail-safe feature which puts the output in a high impedance state when the input is open.

The PDIP package is specifically constructed to allow increased power dissipation over conventional packages. The four ground pins are directly connected to the device chip with a special cooper lead frame. When the quad driver is soldered into a PC board, the power rating of the device improves significantly.



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**Electrical Characteristics<sup>(1)(2)</sup>**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
V <sub>IH</sub>	Input High Voltage		2.0			V
V <sub>IL</sub>	Input Low Voltage				0.8	V
I <sub>IH</sub>	Input High Current	V <sub>IN</sub> = 5.25V, V <sub>CC</sub> = 5.25V		1.0	1.0	μA
I <sub>IL</sub>	Input Low Current	V <sub>IN</sub> = 0.4V			±10	μA
V <sub>IK</sub>	Input Clamp Voltage	I <sub>I</sub> = -12 mA		-0.8	-1.5	V
V <sub>OL</sub>	Output Low Voltage	I <sub>L</sub> = 300 mA		0.2	0.4	V
		I <sub>L</sub> = 600 mA <sup>(3)</sup>		0.35	0.7	V
I <sub>CEX</sub>	Output Leakage Current	V <sub>CE</sub> = 70V, V <sub>IN</sub> = 0.8V			100	μA
V <sub>F</sub>	Diode Forward Voltage	I <sub>F</sub> = 800 mA		1.0	1.6	V
I <sub>R</sub>	Diode Leakage Current	V <sub>R</sub> = 70V			100	μA
I <sub>CC</sub>	Supply Current	All Inputs High		60	85	mA
		All Inputs Low		2	4	mA

- (1) Unless otherwise specified, min/max limits apply across the 0°C to +70°C temperature range and the 4.75V to 5.25V power supply range. All typical values are for T<sub>A</sub> = 25°C and V<sub>CC</sub> = 5.0V.
- (2) All currents into device pins are shown as positive, all currents out of device pins are shown as negative, all voltages are referenced to ground, unless otherwise specified. All values shown as max or min are so classified on absolute value basis.
- (3) All sections of this quad circuit may conduct rated current simultaneously, however, power dissipation averaged over a short interval of time must fall within specified continuous dissipation ratings.

**Switching Characteristics<sup>(1)</sup>**

Symbol	Parameter	Conditions	Min	Typ	Max	Units
t <sub>PHL</sub>	Turn On Delay	R <sub>L</sub> = 60Ω, V <sub>L</sub> = 30V		226	500	ns
t <sub>PLH</sub>	Turn Off Delay	R <sub>L</sub> = 60Ω, V <sub>L</sub> = 30V		2430	8000	ns

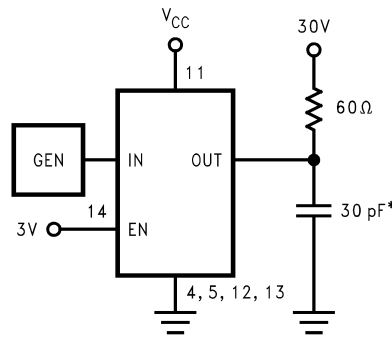
- (1) Unless otherwise specified, min/max limits apply across the 0°C to +70°C temperature range and the 4.75V to 5.25V power supply range. All typical values are for T<sub>A</sub> = 25°C and V<sub>CC</sub> = 5.0V.

**Truth Table<sup>(1)</sup>**

IN	EN	OUT
H	H	L
L	H	Z
H	L	Z
L	L	Z

- (1) H = High state  
L = Low state  
Z = High impedance state

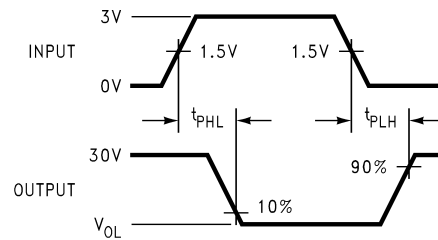
**AC Test Circuit**



\*Includes probe and jig capacitance.

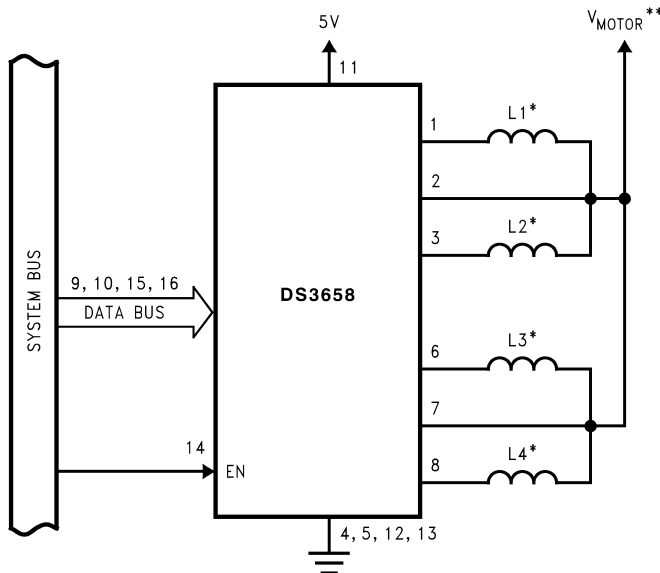
**Figure 2.**

**Switching Waveforms**



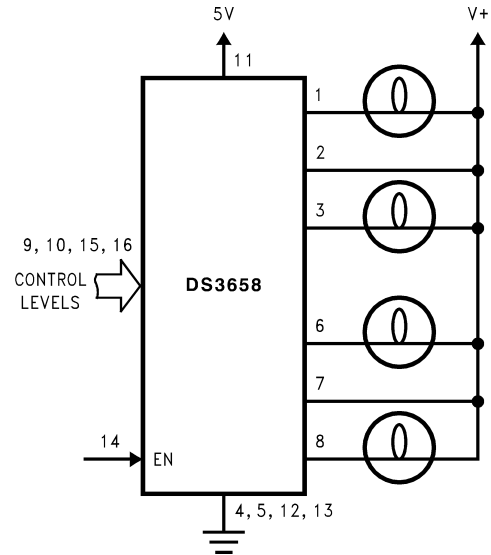
**Figure 3.**

**Typical Applications**



\*L1, L2, L3, L4 are the windings of a bifilar stepping motor.  
 \*\*V<sub>MOTOR</sub> is the supply voltage of the motor.

**Figure 4. Stepping Motor Driver**



**Figure 5. Lamp Driver**

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**REVISION HISTORY**

<b>Changes from Revision A (April 2013) to Revision B</b>	<b>Page</b>
• Changed layout of National Data Sheet to TI format .....	<a href="#">4</a>

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**PACKAGING INFORMATION**

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)	Op Temp (°C)	Top-Side Markings (4)	Samples
DS3658N	ACTIVE	PDIP	NFG	16	25	TBD	Call TI	Call TI	0 to 70	DS3658N	<a href="#">Samples</a>
DS3658N/NOPB	ACTIVE	PDIP	NFG	16	25	Green (RoHS & no Sb/Br)	SN	Level-1-NA-UNLIM	0 to 70	DS3658N	<a href="#">Samples</a>

(1) The marketing status values are defined as follows:

**ACTIVE:** Product device recommended for new designs.

**LIFEBUY:** TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.

**NRND:** Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.

**PREVIEW:** Device has been announced but is not in production. Samples may or may not be available.

**OBSOLETE:** TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS), Pb-Free (RoHS Exempt), or Green (RoHS & no Sb/Br) - please check <http://www.ti.com/productcontent> for the latest availability information and additional product content details.

**TBD:** The Pb-Free/Green conversion plan has not been defined.

**Pb-Free (RoHS):** TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.

**Pb-Free (RoHS Exempt):** This component has a RoHS exemption for either 1) lead-based flip-chip solder bumps used between the die and package, or 2) lead-based die adhesive used between the die and leadframe. The component is otherwise considered Pb-Free (RoHS compatible) as defined above.

**Green (RoHS & no Sb/Br):** TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

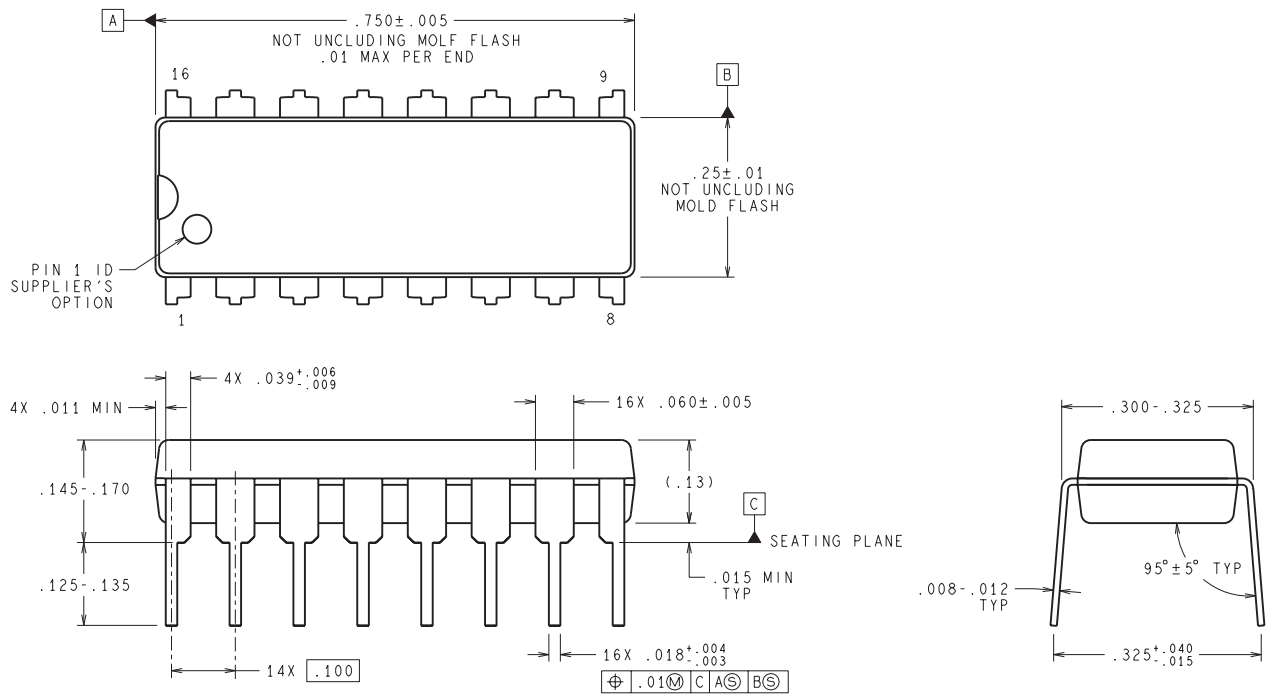
(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.

(4) Multiple Top-Side Markings will be inside parentheses. Only one Top-Side Marking contained in parentheses and separated by a "~" will appear on a device. If a line is indented then it is a continuation of the previous line and the two combined represent the entire Top-Side Marking for that device.

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