



DS3669 Quad High Current Peripheral Driver

General Description

The DS3669 is a non-inverting quad peripheral driver similar to the DS3658. These drivers are 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 AN-213). An on-chip clamp diode capable of handling 800 mA is provided at each output for this purpose. In addition, the DS3669 incorporates circuitry that guarantees glitch-free power up or down operation.

The molded 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 copper lead frame. When the quad driver is soldered into a PC board, the power rating of the device improves significantly.

Applications

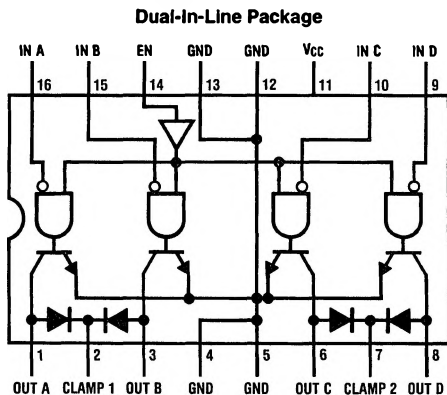
- Relay drivers
- Lamp drivers
- Solenoid drivers
- Hammer drivers

- Stepping motor drivers
- Triac drivers
- LED drivers
- High current, high voltage drivers
- Level translators
- Fiber optic LED drivers

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 μ A typical)
- Low operating power
- Standard 5V power supply
- Power up/down protection
- 2W power package

Connection Diagram



TL/F/5820-1

Top View

Order Number DS3669N
See NS Package Number N16E

Truth Table

| IN | EN | OUT |
|----|----|-----|
| L | H | L |
| H | H | Z |
| L | L | Z |
| H | L | Z |

H = High state
L = Low state
Z = High impedance state

Absolute Maximum Ratings (Note 1)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

| | |
|---|---------|
| Supply Voltage | 7.0V |
| Input Voltage | 15V |
| Output Voltage | 70V |
| Output Current | 1.5A |
| Continuous Power Dissipation @25°C Free-Air (Note 5) | 2075 mW |

| | |
|---|-----------------|
| Storage Temperature Range | -65°C to +150°C |
| Lead Temperature (Soldering, 4 seconds) | 260°C |

Operating Conditions

| | Min | Max | Units |
|---------------------|------|------|-------|
| Supply Voltage | 4.75 | 5.25 | V |
| Ambient Temperature | 0 | 70 | °C |

Electrical Characteristics (Notes 2 and 3)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------|------------------------|---|-----|------|----------|---------|
| V_{IH} | Input High Voltage | | 2.0 | | | V |
| V_{IL} | Input Low Voltage | | | | 0.8 | V |
| I_{IH} | Input High Current | $V_{IN} = 5.25V, V_{CC} = 5.25V$ | | 1.0 | 10 | μA |
| I_{IL} | Input Low Current | $V_{IN} = 0.4V$ | | | ± 10 | μA |
| V_{IK} | Input Clamp Voltage | $I_I = -12 \text{ mA}$ | | -0.8 | -1.5 | V |
| V_{OL} | Output Low Voltage | $I_L = 300 \text{ mA}$ | | 0.2 | 0.4 | V |
| | | $I_L = 600 \text{ mA}$ (Note 4) | | 0.35 | 0.7 | V |
| I_{CEX} | Output Leakage Current | $V_C = 70V, V_{IN} = 2V, V_{EN} = 0.8V$ | | | 100 | μA |
| V_F | Diode Forward Voltage | $I_F = 800 \text{ mA}$ | | 1.0 | 1.6 | V |
| I_R | Diode Leakage Current | $V_R = 70V$ | | | 100 | μA |
| I_{CC} | Supply Current | All Inputs Low $EN = 2.0V$ | | 60 | 85 | mA |
| | | All Inputs High | | 2 | 4 | mA |

Switching Characteristics (Note 2)

| Symbol | Parameter | Conditions | Min | Typ | Max | Units |
|-----------|----------------|-----------------------------|-----|------|------|-------|
| t_{PHL} | Turn On Delay | $R_L = 60\Omega, V_L = 30V$ | | 226 | 500 | ns |
| t_{PLH} | Turn Off Delay | $R_L = 60\Omega, V_L = 30V$ | | 2430 | 8000 | ns |

Note 1: "Absolute Maximum Ratings" are those values beyond which the safety of the device cannot be guaranteed. They are not meant to imply that the device should be operated at these limits. The table of "Electrical Characteristics" provides conditions for actual device operation.

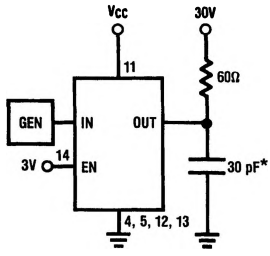
Note 2: Unless otherwise specified, min/max limits apply across the 0°C to +70°C temperature range and the 4.75V to 5.25V power supply range. All typical values are for $T_A = 25^\circ\text{C}$ and $V_{CC} = 5.0V$.

Note 3: 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.

Note 4: 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.

Note 5: For operation over 25°C free-air temperature, derate linearly to 1328 mW @70°C @ the rate of 16.6 mW/°C.

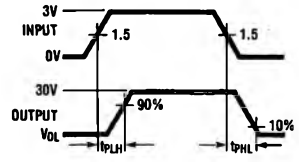
AC Test Circuit



TL/F/5820-2

*Includes probe and jig capacitance

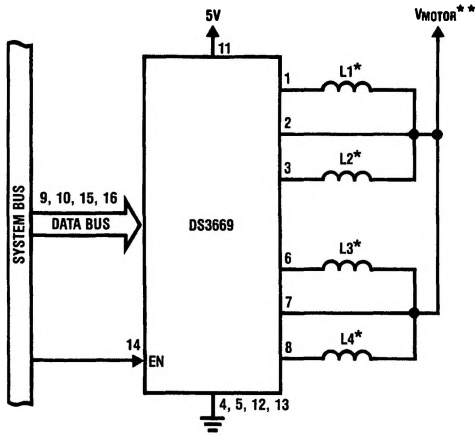
Switching Waveforms



TL/F/5820-3

Typical Applications

Stepping Motor Driver

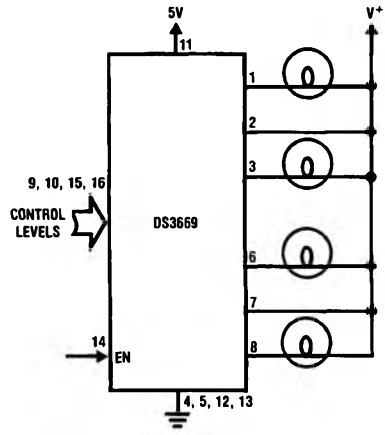


TL/F/5820-4

*L1, L2, L3, L4 are the windings of a bifilar stepping motor.

**VMOTOR is the supply voltage of the motor.

Lamp Driver



TL/F/5820-5