

2A, HALF-BRIDGE DRIVER

DESCRIPTION

The SG1635 is a monolithic integrated circuit designed to interface low-level logic signals with high-current, inductive, or capacitive loads. This device is particularly adept at high-speed pulse width modulation for motor drives or Class D audio amplifiers, and when used in pairs, they can provide full bridge drive for bi-directional control.

With TTL-compatible units, this device will either source or sink up to 5A of peak current with interlock protection to insure that source and sink cannot be on simultaneously. Additional protection is provided by thermal shutdown of the source output if the chip temperature rises above 160°C. High speed internal commutating diodes are also included.

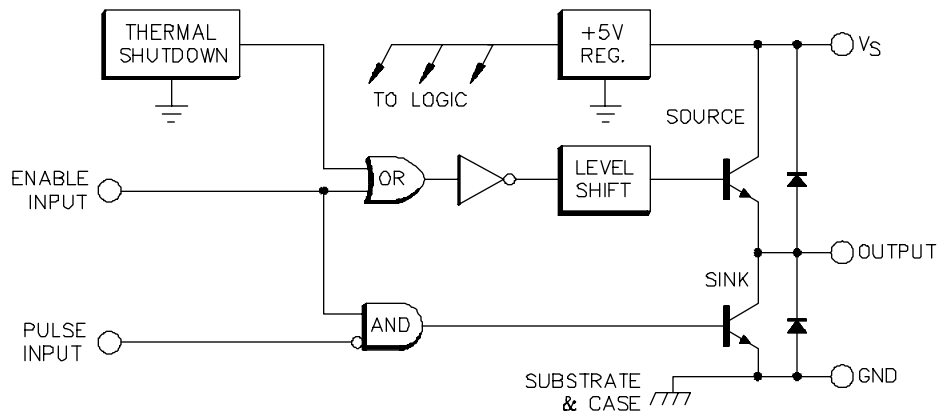
FEATURES

- Source or sink 5A peak
- Half-bridge with internal diodes
- TTL input compatibility
- Either dual- or tri-state output
- Direct PWM motor drive from microprocessor
- Built-in thermal protection
- SG3635P replaces UDN2935Z

HIGH RELIABILITY FEATURES - SG1635

- ◆ Available to MIL-STD-883
- ◆ LMI level "S" processing available

BLOCK DIAGRAM - SG1635/3635



TRUTH TABLE

| Enable | Pulse | Output |
|--------|-------|--------------|
| 0 | 0 | High |
| 0 | 1 | High |
| 1 | 0 | Low |
| 1 | 1 | Off - High Z |

1 = Open or High

ABSOLUTE MAXIMUM RATINGS (Note 1)

| | |
|----------------------------|--|
| Supply Voltage (V_S) | Operating Junction Temperature |
| SG1635/SG3635 40V | Hermetic (R - Package) 150°C |
| Input Voltage | Plastic (P - Package) 150°C |
| Enable and Pulse 7V | Storage Temperature Range -65°C to 150°C |
| Source/Sink Output Current | Lead Temperature (Soldering, 10 Seconds) 300°C |
| Continuous 3A | |
| Peak 5A | |

Note 1. Values beyond which damage may occur.

THERMAL DATA

R Package:

| | |
|---|---------|
| Thermal Resistance-Junction to Case, θ_{JC} | 5.0°C/W |
| Thermal Resistance-Junction to Ambient, θ_{JA} | 40°C/W |

P Package:

| | |
|---|----------|
| Thermal Resistance-Junction to Case, θ_{JT} | 4.0°C/W* |
| Thermal Resistance-Junction to Ambient, θ_{JA} | 55°C/W |

* = θ_{JT} (Junction to Tab)

Note A. Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.

Note B. The above numbers for θ_{JC} are maximums for the limiting thermal resistance of the package in a standard mounting configuration. The θ_{JA} numbers are meant to be guidelines for the thermal performance of the device/pc-board system. All of the above assume no ambient airflow.

RECOMMENDED OPERATING CONDITIONS (Note 2)

| | |
|-------------------------------|-------------------------------------|
| Supply Voltage (V_S) | Source/Sink Output Current |
| SG1635/SG3635 8V to 35V | Continuous 2A |
| | Peak 3A |
| | Operating Ambient Temperature Range |
| | SG1635 -55°C to 125°C |
| | SG3635 0°C to 70°C |

Note 2. Range over which the device is functional.

ELECTRICAL CHARACTERISTICS

SG1635 and SG3635

(Unless otherwise specified, these specifications apply over the operating ambient temperatures for SG1635 with $-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$, SG3635 with $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$, and $+V_S = 24\text{V}$. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

| Parameter | Test Conditions | SG1635/SG3635 | | | Units |
|-------------------------------|---|---------------|------|------|---------------|
| | | Min. | Typ. | Max. | |
| Static Characteristics | | | | | |
| Logic 1 Input Voltage | | 2.0 | | | V |
| Logic 0 Input Voltage | | | | 0.8 | V |
| Input High Current | $V_{PULSE} = V_{ENABLE} = 4.5\text{V}$ | | | 200 | μA |
| Input Low Current | $V_{PULSE} = V_{ENABLE} = 0\text{V}$ | | | -3.2 | mA |
| Output Leakage | $V_{PULSE} = V_{ENABLE} = 2.0\text{V}$ | | | | |
| | $V_{OUT} = 24\text{V}$ | | | 500 | mA |
| | $V_{OUT} = 0\text{V}$ | | | 40 | mA |
| Source Saturation Voltage | $V_{PULSE} = 2.0\text{V}, V_{ENABLE} = 0.8\text{V}, I_{OUT} = -2\text{A}$ | | 2.0 | 3.0 | V |
| Sink Saturation Voltage | $V_{PULSE} = 0.8\text{V}, V_{ENABLE} = 2.0\text{V}, I_{OUT} = 2\text{A}$ | | 2.0 | 3.0 | V |
| Diode Forward Voltage | $I_{DIODE} = \pm 2\text{A}$ | | 2.0 | 3.0 | V |
| Supply Current | $V_S = 35\text{V}$ | | | | |
| | $V_{PULSE} = 2.0\text{V}, V_{ENABLE} = 0.8\text{V}$ | | | 25 | mA |
| | $V_{PULSE} = 0.8\text{V}, V_{ENABLE} = 2.0\text{V}$ | | | 70 | mA |

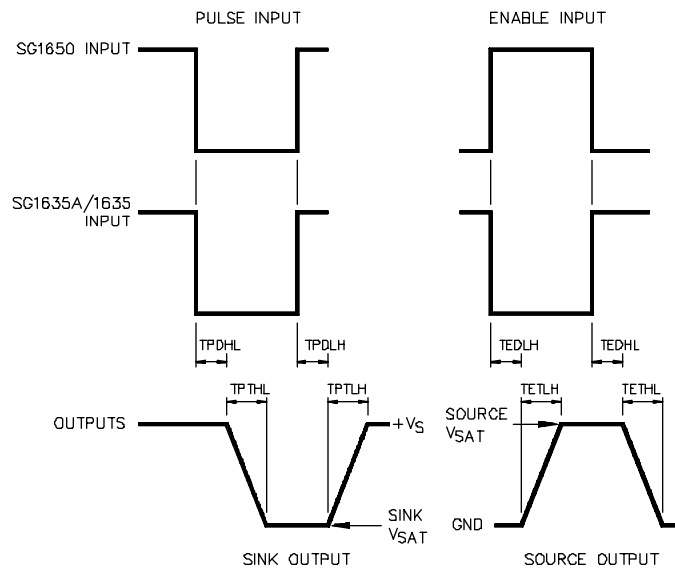
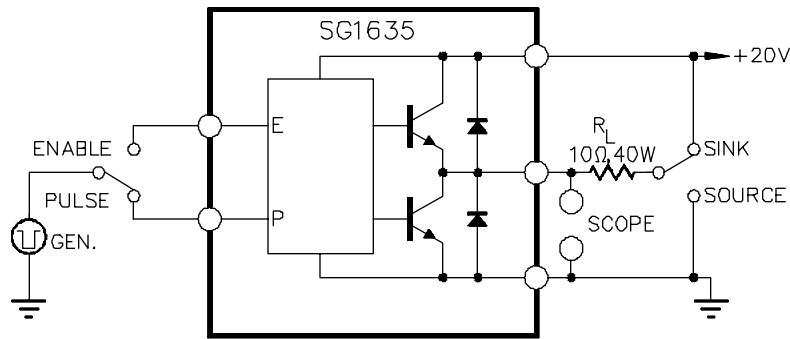
ELECTRICAL CHARACTERISTICS (continued)

| Parameter | Definition | SG1635/3635 | | | Units |
|--|------------------------|-------------|------|------|-------|
| | | Min. | Typ. | Max. | |
| Dynamic Characteristics (Notes 3 and 4) | | | | | |
| Pulse Propagation Delay | Turn-On Delay (TPDHL) | | 50 | | ns |
| | Turn-Off Delay (TPDLH) | | 100 | | ns |
| Pulse Transition Time | Turn-On (TPTHL) | | 200 | | ns |
| | Turn-Off (TPTLH) | | 200 | | ns |
| Enable Propagation Delay | Turn-On Delay (TEDLH) | | 200 | | ns |
| | Turn-Off Delay (TEDHL) | | 100 | | ns |
| Enable Transition Time | Turn-On (TETLH) | | 100 | | ns |
| | Turn-Off (TETHL) | | 100 | | ns |

Note 3. T_j = 25°C.

Note 4. Although these parameters are guaranteed, they are not tested in production.

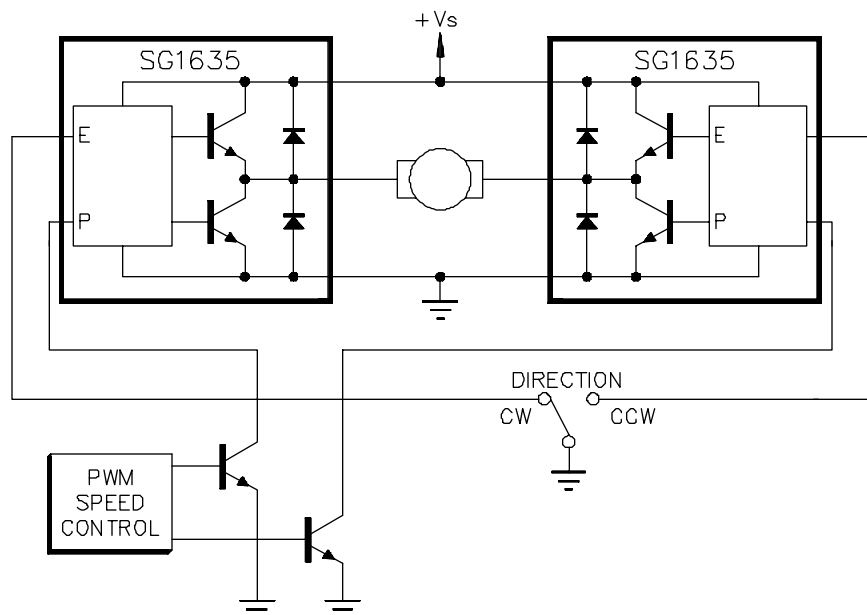
AC TEST CIRCUIT AND SWITCHING TIME WAVEFORMS - FIGURE 1



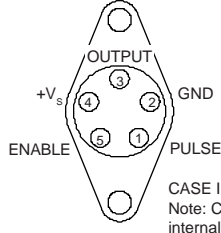
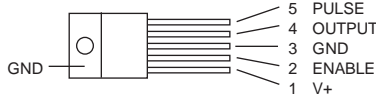
APPLICATION INFORMATION

TYPICAL MOTOR DRIVE APPLICATION

Two SG1635's form a full bridge motor drive circuit with the appropriate Enable Input, determining motor direction, and a PWM signal into the Pulse Inputs, determining speed. Because of the internal Enable interlock, both Pulse Inputs may be connected together to a single-ended PWM signal.



CONNECTION DIAGRAMS/ORDERING INFORMATION (See Notes Below)

| Package | Part No. | Ambient Temperature Range | Connection Diagram |
|--------------------------------------|------------------------------------|---|--|
| 5-PIN TO-66 METAL CAN R - PACKAGE | SG1635R/883B SG1635R SG3635R | -55°C to 125°C -55°C to 125°C 0°C to 70°C |  <p>CASE IS GROUND Note: Case and tab are internally connected to substrate ground.</p> |
| 5-PIN TO-220 PLASTIC P - PACKAGE | SG3635P | 0°C to 70°C |  <p>Case + Tab are internally connected</p> |

Notes: 1. Contact factory for JAN and DESC part availability.
2. All parts are viewed from the top.