# High Voltage Half Bridge Gate Drive IC

## General description

The ID7U603 is a high voltage, high speed power MOSFET and IGBT driver based on P_sub P_epi process. The floating channel driver can be used to drive two N-channel power MOSFETs or IGBTs in a half-bridge configuration which operates up to 600V. Logic inputs are compatible with standard CMOS or LSTTL output, down to 3.3V logic. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. Propagation delays are matched to simplify use in high frequency applications.

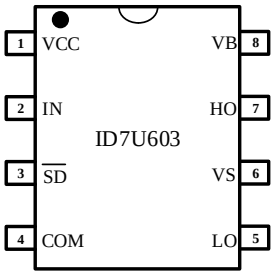
## Features

- Operation to +600 V
- Typically 210 mA/360 mA Source/Sink current
- 5 V and 3.3 V input logic compatible
- dV/dt Immunity ±50 V/nsec
- Gate drive supply range from 10 V to 20 V
- UVLO for VCC and VBS
- Cross-conduction prevention logic with 520ns internal fixed Dead time
- Matched propagation delay for all channels

## Application

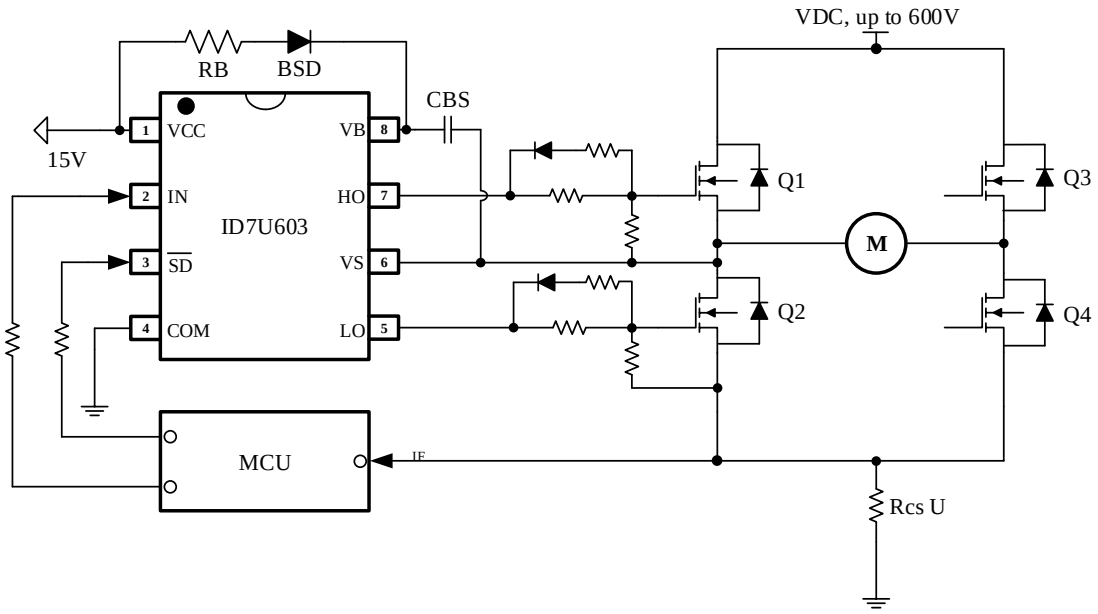
- Small and medium-power motor driver
- Power MOSFET or IGBT driver
- Lighting ballast
- Half-Bridge Power Converters
- Full-Bridge Power Converters

## Package/Order Information




| Order code | Package |
|---|---|
| ID7U603SEC-R1 | SOP8 |

## Typical Application Circuit



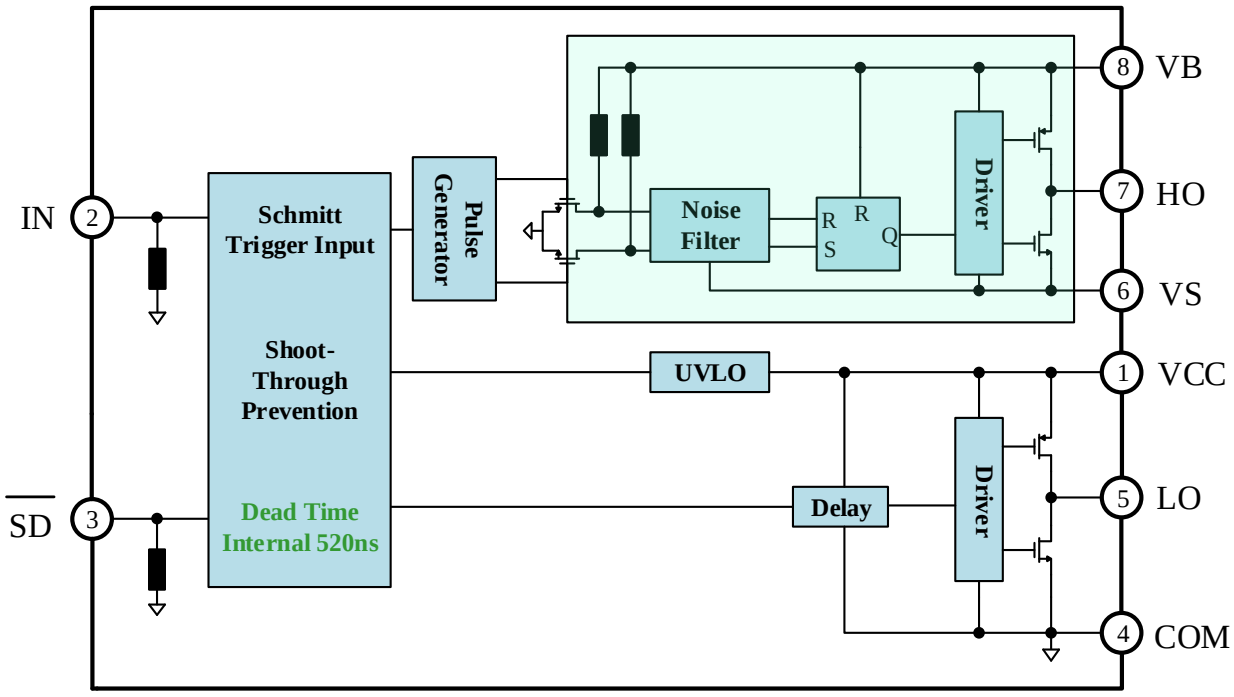

Note 1:

Add RB between $V_{CC}$ and Bootstrap Diode, to avoid VB-VS over-shoot when CBS is charged first time. The recommended value for RB is 10 ohm.

## Pin Definitions

| Pin Name | Pin Number | Pin Function Description |
|---|---|---|
| VCC | 1 | Low side and main power supply |
| IN | 2 | Logic input for high and low side gate driver outputs (HO and LO) |
| $\overline{SD}$ | 3 | Logic input for shutdown |
| COM | 4 | Low side return |
| LO | 5 | Low side gate drive output, Out phase with LIN |
| VS | 6 | High side floating supply return or bootstrap return |
| HO | 7 | High side gate drive output, in phase with HIN |
| VB | 8 | High side floating supply |

## Functional Block Diagram



## Absolute Maximum Ratings

Exceeding these ratings may damage the device.
The absolute maximum ratings are stress ratings only at $T_A$=25 ℃, unless otherwise specified.

| Symbol | Definition | MIN. | MAX. | Units |
|---|---|---|---|---|
| $V_B$ | High side floating supply | -0.3 | 620 | V |
| $V_S$ | High side floating supply return | $V_B$ - 20 | $V_B$ + 0.3 | |
| $V_{HO}$ | High side gate drive output | $V_S$ - 0.3 | $V_B$ + 0.3 | |
| $V_{CC}$ | Low side and main power supply | -0.3 | 20 | |
| $V_{LO}$ | Low side gate drive output | -0.3 | $V_{CC}$ + 0.3 | |
| $V_{IN}$ | Logic input of IN and $\overline{SD}$ | -0.3 | $V_{CC}$ + 0.3 | |
| $dV_S/dt$ | Allowable Offset Supply Voltage Transient | — | 50 | V/ns |
| ESD | HBM Model | 2 | — | kV |
| | Machine Model | 200 | — | V |
| $P_D$ | Package Power Dissipation @ $T_A \leq 25°C$ (8 Lead SOP) | — | 0.625 | W |
| $R_{thJA}$ | Thermal Resistance Junction to Ambient (8 Lead SOP) | — | 200 | ℃ /W |
| $T_J$ | Junction Temperature | — | 150 | ℃ |
| $T_S$ | Storage Temperature | -55 | 150 | |
| $T_L$ | Lead Temperature (Soldering, 10 seconds) | — | 300 | |

## Recommended Operating Conditions

| Symbol | Definition | Min. | Max. | Units |
|---|---|---|---|---|
| $V_B$ | High side floating supply | $V_S$ +10 | $V_S$ +20 | V |
| $V_S$ | High side floating supply return | - | 600 | |
| $V_{HO}$ | High side gate drive output voltage | $V_S$ | $V_B$ | |
| $V_{CC}$ | Low side supply | 10 | 20 | |
| $V_{LO}$ | Low side gate drive output voltage | 0 | $V_{CC}$ | |
| $V_{IN}$ | Logic input voltage(IN & $\overline{SD}$) | 0 | $V_{CC}$ | |
| $T_A$ | Ambient temperature | -40 | 125 | ℃ |

## Dynamic Electrical Characteristics

($V_{BIAS}$ ($V_{CC}$, $V_{BS}$) = 15V, $C_L$ = 1000 pF and $T_A$ = 25 ℃ unless otherwise specified.)

| Symbol | Definition | MIN | TYP. | MAX. | Units |
|---|---|---|---|---|---|
| $t_{on}$ | High side turn-on propagation delay | - | 680 | 820 | ns |
| $t_{off}$ | High side turn-off propagation delay | - | 150 | 220 | |
| $t_{\overline{SD}}$ | Low side turn-on propagation delay | - | 160 | 220 | |
| MT | Delay matching | - | - | 60 | |
| DT | Dead time | 400 | 520 | 650 | |
| $t_r$ | Turn-on rise time | - | 100 | 170 | |
| $t_f$ | Turn-off fall time | - | 50 | 90 | |

## Static Electrical Characteristics

($V_{BIAS}$ ($V_{CC}$, $V_{BS}$) = 15V, $C_L$ = 1000 pF and $T_A$ = 25 ℃ unless otherwise specified.)

| Symbol | Definition | MIN. | TYP. | MAX. | Units |
|---|---|---|---|---|---|
| $V_{IH}$ | Logic “1”(IN & $\overline{SD}$) input voltage | 2.5 | - | - | V |
| $V_{IL}$ | Logic “0” (IN & $\overline{SD}$) input voltage | - | - | 0.8 | |
| $V_{OH}$ | High level output voltage, $V_{BIAS}$ - $V_O$ | - | - | 0.3 | |
| $V_{OL}$ | Low level output voltage, $V_O$ | - | - | 0.3 | |
| $I_{QCC}$ | Quiescent $V_{CC}$ supply current | - | 150 | 270 | uA |
| $I_{QBS}$ | Quiescent $V_B$ supply current | - | 30 | 55 | |
| $I_{LK}$ | Leakage current from $V_S$(600V) to GND | | - | 10 | |
| $I_{IN+}$ | Logic “1” input bias current | - | 6 | 10 | |
| $I_{IN-}$ | Logic “0” input bias current | - | - | 1 | |
| $V_{CCU+}$ | $V_{CC}$ supply UVLO threshold | - | 8.9 | - | V |
| $V_{CCU-}$ | | - | 8.2 | - | |
| $I_{O+}$ | Output high short circuit pulsed current | 130 | 210 | - | mA |
| $I_{O-}$ | Output low short circuit pulsed current | 270 | 360 | - | |

## Function Timing Diagram

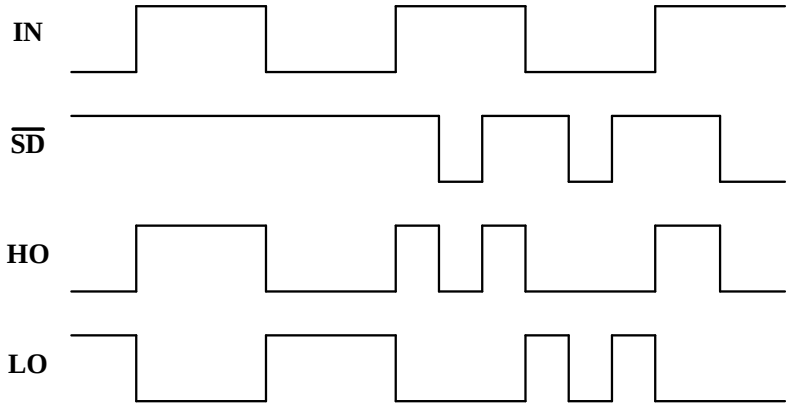



Fig.1 Input/output timing waveform

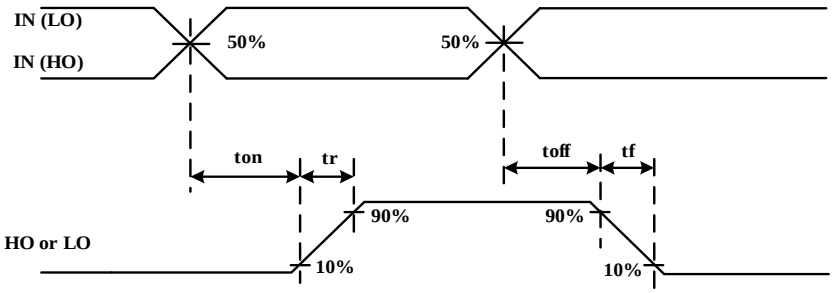



Fig.2 Switching time waveform definitions

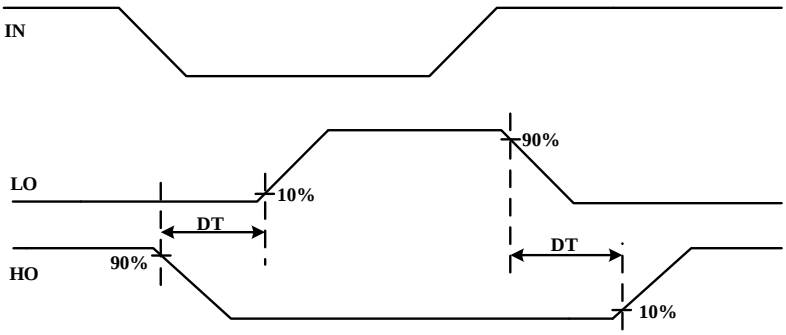
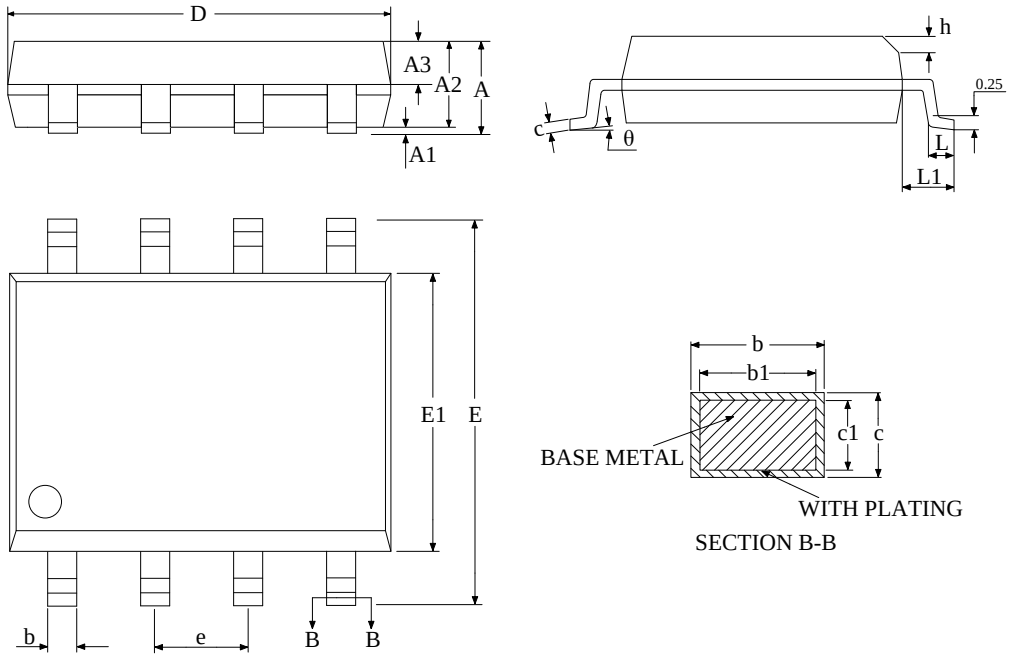



Fig.3 Dead-time waveform definitions

# Package Information

## Package Information SOP8




| Symbol \ Size | Min. (mm) | Max. (mm) | Symbol \ Size | Min. (mm) | Max. (mm) |
|---|---|---|---|---|---|
| A | 1.499 | 1.750 | e | 1.27TYP | |
| A1 | 0.102 | 0.249 | h | - | - |
| A2 | 1.397 | - | h1 | 0.254 | 0.457 |
| b | 0.406TYP | | L | 0.406 | 0.889 |
| c | 0.2TYP | | θ1 | 12 °TYP | |
| D | 4.852 | 4.952 | θ2 | 12 °TYP | |
| E | 5.842 | 6.198 | θ3 | 0 | 8 |
| E1 | 3.877 | 3.997 | θ4 | 45 | |

| Top mark | Package |
|---|---|
| iDR.<br>ID7U603<br>YWWXXXXX | SOP8 |

Note：Y：Year Code；WW：Week Code；XXXXX：Internal Code

Notes:
1. This drawing is subjected to change without notice.
2. Body dimensions do not include mold flash or protrusion.

## Important Notice

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