onse

SOIC−28, 300 mils
CASE 751BM−01

Description

The FAN73894 is a monolithic three−phase half−bridge gate−drive IC designed for high−voltage, high−speed, driving MOSFETs and IGBTs operating up to +600 V.

onsemi's high−voltage process and common−mode noise−canceling technique provide stable operation of high−side drivers under high−dV_s/dt noise circumstances.

An advanced level−shift circuit allows high−

sense resistor. An open−drain fault

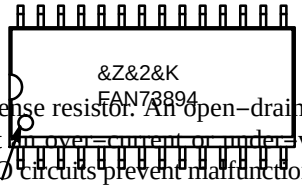
signal is provided to indicate that an over−current or under−voltage shutdown has occurred. The UVLO circuits prevent malfunction when V

DD and V_{BS} are lower than the threshold voltage.

Output drivers typically source and sink 350 mA and 650 mA, respectively; which is suitable for three−phase half−bridge−

Gate Production

MARKING DIAGRAM



FAN73894 = Specific Device Code
&Z = Assembly Plant Code
&2 = 2−Digit Date Code Format
&K = 2−Digits Lot Run Traceability Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 15 of this data sheet.

Applications

- 3−Phase Motor Inverter Driver
- Air Conditioner, Washing Machine, Refrigerator, Dish Washer
- Industrial Inverter – Sewing Machine, Power Tool
- General−Purpose Three−Phase Inverter

- Common−Mode dV_s/dt Noise−Canceling Circuit
- Built−in Advanced Input Filter

TYPICAL APPLICATION DIAGRAM

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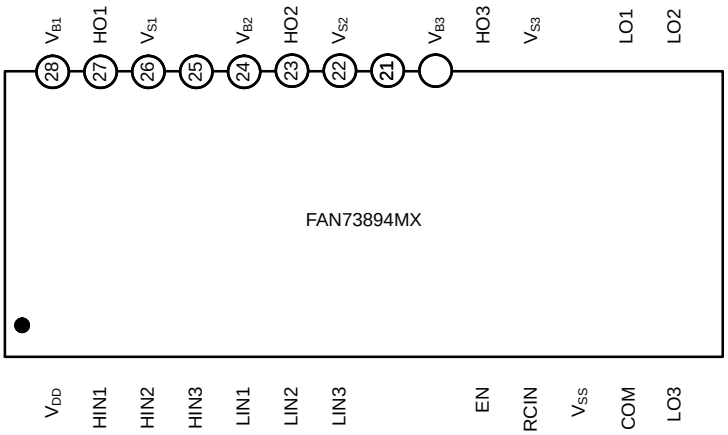
PIN CONFIGURATION



ABSOLUTE MAXIMUM RATINGS (T

ELECTRICAL CHARACTERISTICS (V_{BIAS} (V_{DD}, $V_{BS1,2,3}$) = 15.0 V and T_A = 25°C unless otherwise specified. The V_{IN} and I_{IN} parameters are referenced to V_{SS} and are applicable to all six channels. The V_O and I_O parameters are referenced to $V_{S1,2,3}$ and COM and are applicable to the respective output leads: HO1,2,3 and LO1,2,3. The V_{DDUV} parameters are referenced to V_{SS}. The V_{BSUV} parameters are referenced to $V_{S1,2,3}$.)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
LOW−SIDE POWER SUPPLY SECTION						
I_{QDD}	Quiescent V_{DD} Supply Current	$V_{LIN1,2,3}$ = 5 V or open, EN = 0 V	–	250	400	μA
I_{PDD}	Operating V_{DD} Supply Current	$f_{LIN1,2,3}$ = 20 kHz, rms Value	–	550	750	μA
V_{DDUV+}	V_{DD} Supply Under−Voltage Positive−Going Threshold	V_{DD} = Sweep	9.7	11.0	12.0	V
V_{DDUV-}	V_{DD} Supply Under−Voltage Negative−Going Threshold	V_{DD} = Sweep	9.2	10.5	11.4	V
V_{DDHYS}	V_{DD} Supply Under−Voltage Lockout Hysteresis	V_{DD}				

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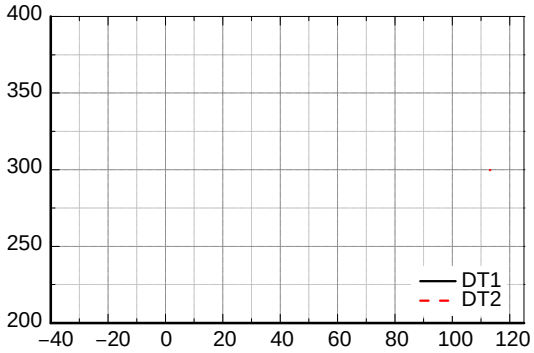
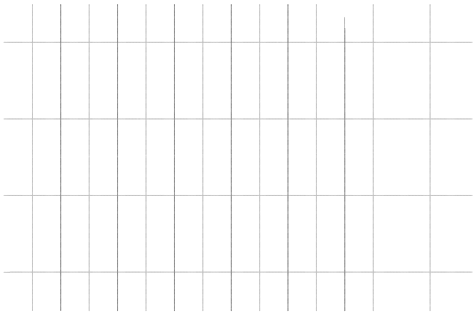
ELECTRICAL CHARACTERISTICS (V_{BIAS} (V_{DD}, $V_{BS1,2,3}$) = 15.0 V and T_A = 25°C unless otherwise specified. The V_{IN} and I_{IN} parameters are referenced to V_{SS} and are applicable to all six channels. The V_O and I_O parameters are referenced to $V_{S1,2,3}$

TYPICAL CHARACTERISTICS (continued)



TYPICAL CHARACTERISTICS (continued)



TYPICAL CHARACTERISTICS (continued)

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SWITCHING TIME DEFINITIONS

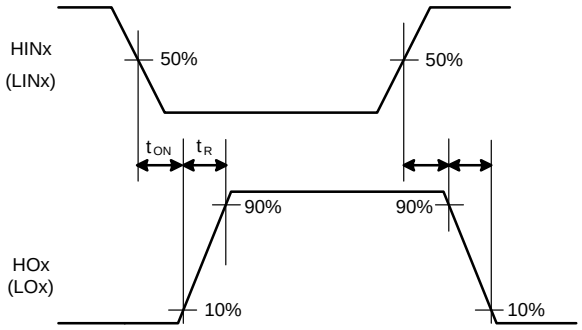

Figure 34. Switching Time Waveform Definitions

Figure 35. Input / Output Timing Diagram

Figure 36. Detailed View of B and C Intervals During Over−Current Protection

APPLICATIONS INFORMATION

Dead Time

Dead time is automatically inserted whenever the dead time of the external two input signals (between $\overline{\text{HINx}}$ and $\overline{\text{LINx}}$ signals) is shorter than internal fixed dead times (DT1 and DT2). Otherwise, external dead times larger than internal dead times are not modified by the gate driver and internal dead−time waveform definition is shown in

Enable Input

When the EN pin is in HIGH state, the gate driver operates normally. When a condition occurs that should shut down the gate driver, the EN pin should be LOW. The enable circuitry has an input filter; the minimum input duration is specified by t_{FLTIN} (typically 250 ns).

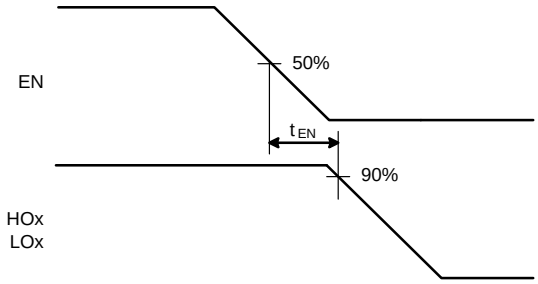

Figure 41. Output Enable Timing Waveform

Fault−Out ($\overline{FO}$) and Over−Current Protection

FAN73894 provides an integrated fault output ($\overline{FO}$) and an adjustable fault−clear timer (t_{FLTCLR}). There are two situations that cause the gate driver to report a fault via the $\overline{FO}$ pin. The first is an under−voltage condition of low−side gate driver supply voltage (V_{DD}) and the second is when the current−sense pin (CS) recognizes a fault. If a fault condition occurs, the $\overline{FO}$ pin is internally pulled to COM, the fault−clear timer is activated, and all outputs (HO1, 2, 3 and LO1, 2, 3) of the gate driver are turned off. The fault output stays LOW until the fault condition has been removed and the fault

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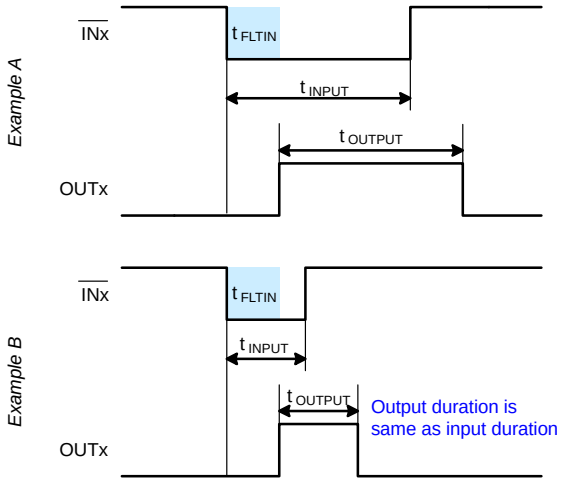


Figure 44. Input Noise Filter Definition

Short−Pulsed Input Noise Rejection Method

The input filter circuitry provides protection against short−pulsed input signals ($\overline{\text{HIN}}$x, $\overline{\text{LIN}}$x and EN) on the input signal lines by applied noise signal.

If the input signal duration is less than input filter time (t_{FLTIN}), the output does not change states.

Example A and B of the Figure 45 show the input and output waveforms with short−pulsed noise spikes with a duration less than input filter time; the output does not change states.

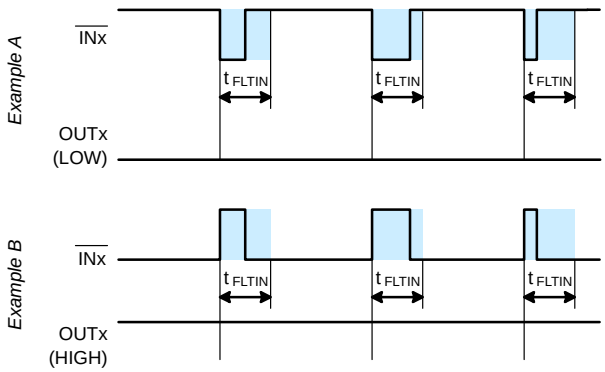


Figure 45. Noise Rejecting Input Filter Definition

Figure 46 shows the characteristics of the input filters while receiving narrow ON and OFF pulses. If input signal pulse duration, PW_{IN}, is less than input filter time, t_{FLTIN}; the output pulse, PW_{OUT}, is zero. The input signal is rejected by input filter. Once the input signal pulse duration, PW_{IN}, exceeds input filter time, t_{FLTIN}, the output pulse durations, PW_{OUT}, matches the input pulse durations, PW_{IN}. FAN73894 input filter time, $t_{FLTIN,}$ is about 250 ns for the high− and low−side outputs.

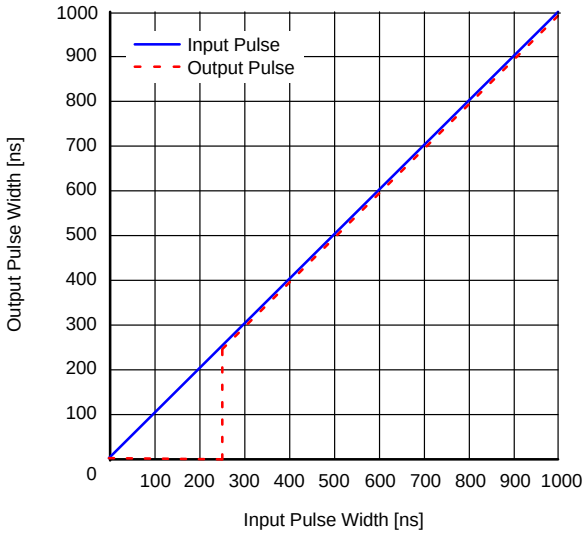


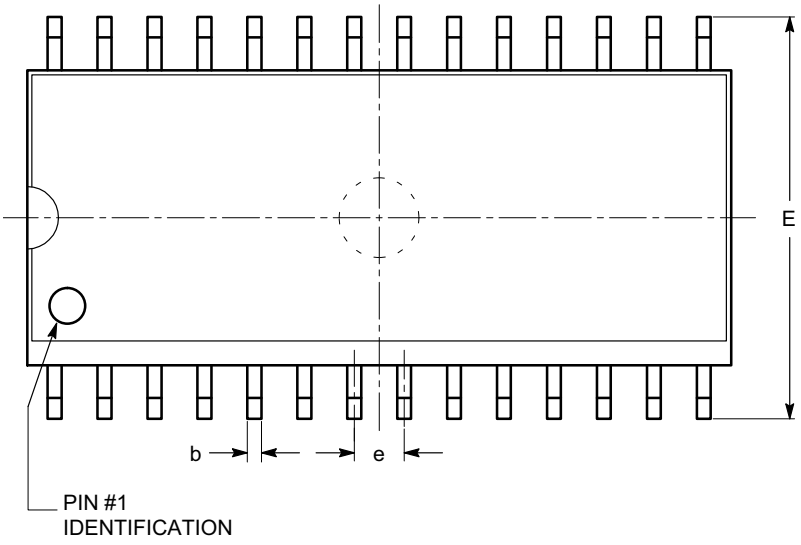
Figure 46. Input Filter Characteristic of Narrow ON

ORDERING INFORMATION

Part Number	Package	Operating Temperature	Shipping

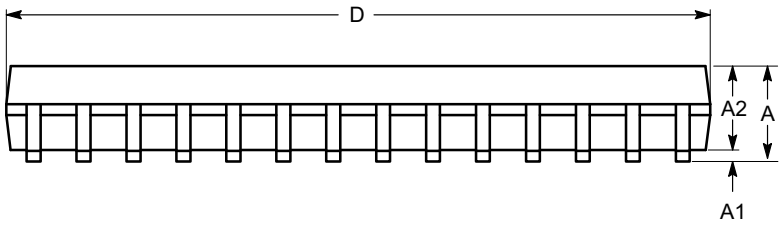
SOIC−28, 300 mils
CASE 751BM
ISSUE O

DATE 19 DEC 2008

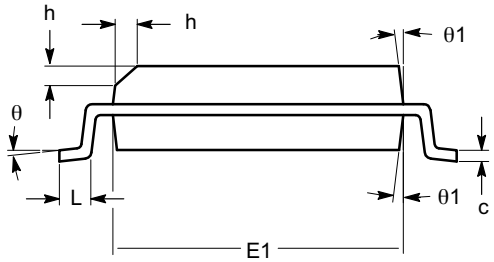


TOP VIEW

SYMBOL	MIN	NOM	MAX
A	2.35		2.65
A1	0.10		0.30
A2	2.05		2.55
b	0.31		0.51
c	0.20		0.33
D	17.78		18.03
E	10.11		10.51
E1	7.34		7.60
e		1.27 BSC	
h	0.25		0.75
L	0.40		1.27
θ	0		8
θ1	5		15



SIDE VIEW



END VIEW

Notes:
(1) All dimensions are in millimeters. Angles in degrees.
(2) Complies with JEDEC MS-013.

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