

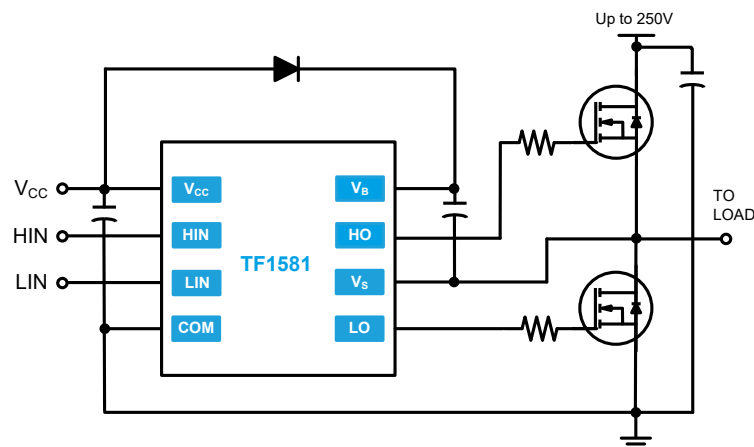
Features

- Floating high-side driver in bootstrap operation to 250V
- Drives two N-channel MOSFETs or IGBTs in a half bridge configuration
- 1.9A source / 2.3A sink output current capability
- Outputs tolerant to negative transients
- Wide low side gate driver supply voltage: 10V to 20V
- Logic input (HIN and LIN) 3.3V capability
- Schmitt triggered logic inputs with internal pull down
- Undervoltage lockout for high and low side drivers
- Extended temperature range: -40°C to +125°C

Applications

- DC-DC Converters
- AC-DC Inverters
- Motor Controls
- Class D Power Amplifiers

Typical Application

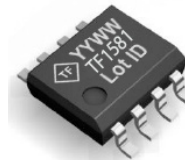


Description

The TF1581 is a high voltage, high speed gate driver capable of driving N-channel MOSFETs and IGBTs in a half bridge configuration. TF Semiconductor's high voltage process enables the TF1581's high side to switch to 250V in a bootstrap operation.

The TF1581 logic inputs are compatible with standard TTL and CMOS levels (down to 3.3V) to interface easily with controlling devices. The driver outputs feature high pulse current buffers designed for minimum driver cross conduction.

The TF1581 is offered in SOIC-8(N) packages and operate over an extended -40 °C to +125 °C temperature range.

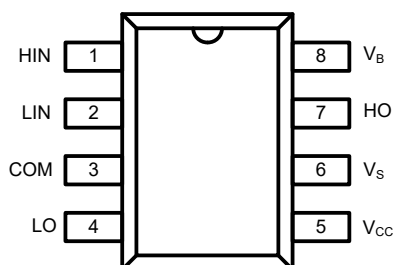


SOIC-8(N)

Ordering Information

PART NUMBER	PACKAGE	PACK / Qty	MARK	
			Year	Week
TF1581-TAU	SOIC-8(N)	Tube / 100	TF	YYWW
TF1581-TAH	SOIC-8(N)	T&R / 2500		TF1581
				Lot ID

Pin Diagrams



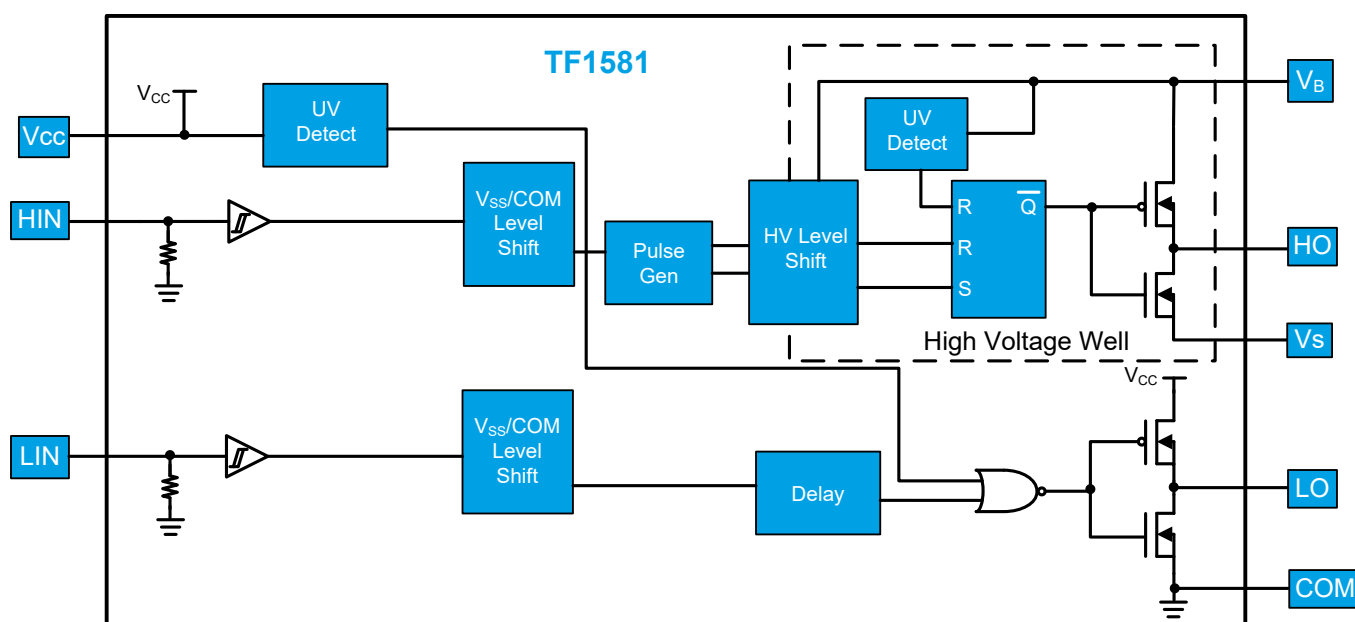
Top View: PDIP-8, SOIC-8

TF1581

Pin Descriptions

PIN NAME	PIN NUMBER	PIN DESCRIPTION
HIN	1	Logic input for high-side gate driver output, in phase with HO.
LIN	2	Logic input for low-side gate driver output, in phase with LO.
COM	3	Low-side and logic return
LO	4	Low-side gate drive output
V _{CC}	5	Low-side and logic fixed supply
V _S	6	High-side floating supply return
HO	7	High-side gate drive output
V _B	8	High-side floating supply

Functional Block Diagram





Absolute Maximum Ratings (NOTE1)

V_B - High side floating supply voltage.....-0.3V to +274V
 V_S - High side floating supply offset voltage... V_B -24V to V_B +0.3V
 V_{HO} - High side floating output voltage..... V_S -0.3V to V_B +0.3V
 dV_S/dt - Offset supply voltage transient.....50V/ns

V_{CC} - Low-side fixed supply voltage.....-0.3V to +24V
 V_{LO} - Low-side output voltage.....-0.3V to V_{CC} +0.3V
 V_{IN} - Logic input voltage (HIN and LIN).....-0.3V to V_{CC} +0.3V

NOTE1 Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

P_D - Package power dissipation at $T_A \leq 25^\circ\text{C}$
 SOIC-8.....0.625W
 PDIP-8.....1.0W

SOIC-8(N) Thermal Resistance (NOTE2)

θ_{JA}200 °C/W

PDIP-8 Thermal Resistance (NOTE2)

θ_{JA}125 °C/W

T_J - Junction operating temperature.....+150 °C

T_L - Lead Temperature (soldering, 10 seconds).....+300 °C

T_{stg} - Storage temperature-55 to 150 °C

NOTE2 When mounted on a standard JEDEC 2-layer FR-4 board.

Recommended Operating Conditions

Symbol	Parameter	MIN	MAX	Unit
V_B	High side floating supply absolute voltage	$V_S + 10$	$V_S + 20$	V
V_S	High side floating supply offset voltage	NOTE3	250	V
V_{HO}	High side floating output voltage	V_S	V_B	V
V_{CC}	Low side fixed supply voltage	10	20	V
V_{LO}	Low side output voltage	0	V_{CC}	V
V_{IN}	Logic input voltage (HIN and LIN)	0	5	V
T_A	Ambient temperature	-40	125	°C

NOTE3 Logic operational for V_S of -5V to +250V. Logic state held for V_S of -5V to -VBS



DC Electrical Characteristics (NOTE4)

$V_{BIAS} (V_{CC}, V_{BS}) = 15V, T_A = 25^\circ C$, unless otherwise specified.

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
V_{IH}	Logic "1" input voltage	$V_{CC} = 10V$ to $20V$	2.5			V
V_{IL}	Logic "0" input voltage				0.8	
V_{OH}	High level output voltage, $V_{BIAS} - V_O$	$I_O = 0A$			1.4	
V_{OL}	Low level output voltage, V_O	$I_O = 20mA$			0.2	
I_{LK}	Offset supply leakage current	$V_B = V_S = 250V$			50	μA
I_{BSQ}	Quiescent V_{BS} supply current	$V_{IN} = 0V$ or $5V$	20	60	150	
I_{CCQ}	Quiescent V_{CC} supply current	$V_{IN} = 0V$ or $5V$	50	120	240	μA
I_{IN+}	Logic "1" input bias current	$V_{IN} = 5V$		25	60	μA
I_{IN-}	Logic "0" input bias current	$V_{IN} = 0V$			5.0	
V_{BSUV+}	V_{BS} supply under-voltage positive going threshold		8.0	8.9	9.8	V
V_{BSUV-}	V_{BS} supply under-voltage negative going threshold		7.4	8.2	9.0	
V_{CCUV+}	V_{CC} supply under-voltage positive going threshold		8.0	8.9	9.8	
V_{CCUV-}	V_{CC} supply under-voltage negative going threshold		7.4	8.2	9.0	
I_{O+}	Output high short circuit pulsed current	$V_O = 0V, PW \leq 10 \mu s$	1.4	1.9		A
I_{O-}	Output low short circuit pulsed current	$V_O = 15V, PW \leq 10 \mu s$	1.8	2.3		

NOTE4 The V_{IH} , V_{TH} , and I_{IN} parameters are applicable to the two logic input pins: LIN and HIN. The V_O and I_O parameters are applicable to the respective output pins: HO and LO.



AC Electrical Characteristics

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

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
t_{on}	Turn-on propagation delay	$V_S = 0V$		180	270	ns
t_{off}	Turn-off propagation delay	$V_S = 0V$ or $250V$		220	330	
t_{DM}	Delay matching, HS & LS turn-on/off				35	
t_r	Turn-on rise time	$V_S = 0V$		40	60	
t_f	Turn-off fall time			20	35	



Timing Waveforms

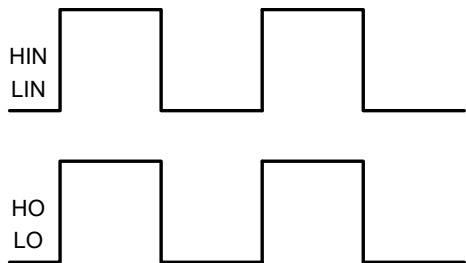


Figure 1. Input / Output Timing Diagram

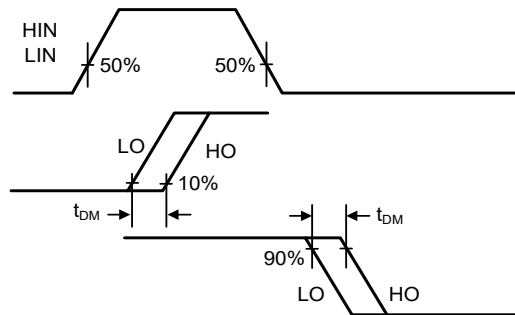


Figure 2. Delay Matching Waveform Definitions

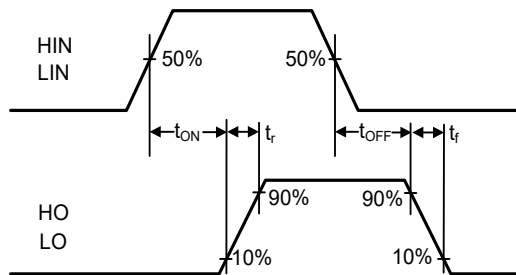
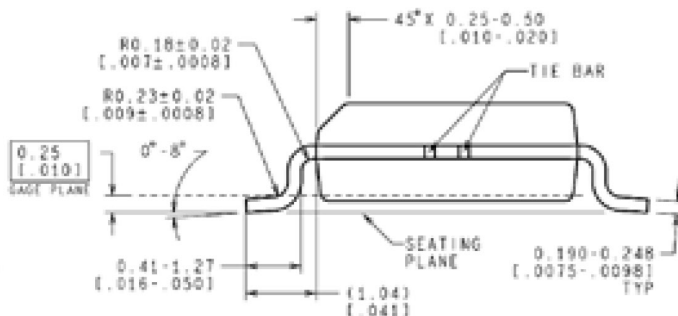
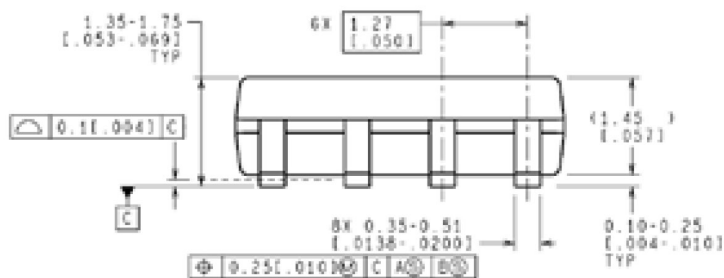
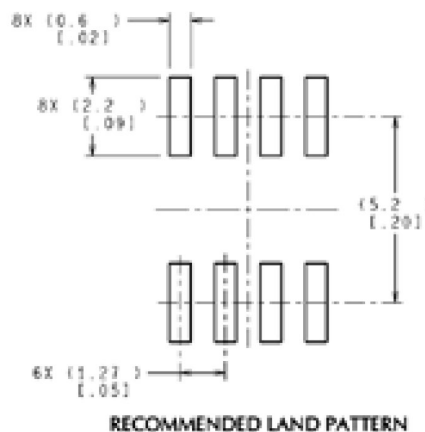
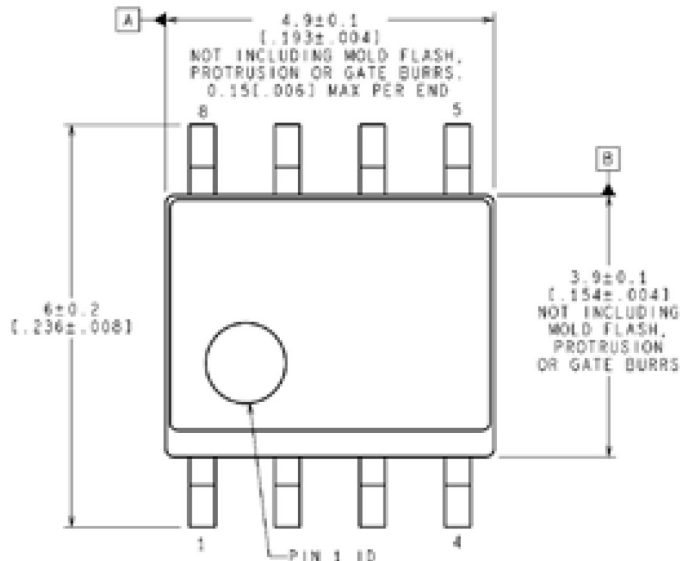


Figure 3. Switching Time Waveform Definitions



Package Dimensions (SOIC-8 N)

Please contact support@tfsemi.com for package availability.



NOTES: UNLESS OTHERWISE SPECIFIED

1. REFERENCE JEDEC REGISTRATION MS-012, VARIATION AA.

CONTROLLING DIMENSION IS MILLIMETER
VALUES IN [] ARE INCHES
DIMENSIONS IN () FOR REFERENCE ONLY



Revision History

Rev.	Change	Owner	Date
1.0	First release, final datasheet	Keith Spaulding	11/8/2016
1.1	Text edit	Keith Spaulding	1/25/2018

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