

Description

The TF21844 is a high voltage, high speed gate driver capable of driving N-channel MOSFETs and IGBTs in a half bridge configuration. TF Semiconductors's high voltage process enables the TF21844's high side to switch to 600V in a bootstrap operation.

The TF21844 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. Programmable dead time, by an external resistor, provides more system level flexibility.

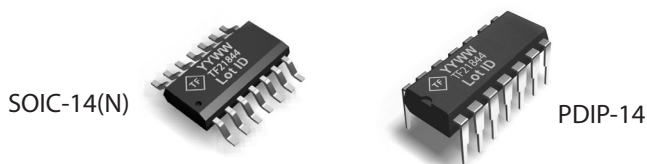
The TF21844 is offered in PDIP-14 and SOIC-14(N) packages. It operates over an extended -40 °C to +125 °C temperature range.

Features

- Floating high-side driver in bootstrap operation to 600V
- Drives two N-channel MOSFETs or IGBTs in a half-bridge configuration
- 1.4A source / 1.8A sink output current capability
- Outputs tolerant to negative transients
- Programmable dead time to protect MOSFETs
- Wide low-side gate driver supply voltage: 10V to 20V
- Wide logic supply voltage offset voltage: -5V to 5V
- Logic input (IN and SD*) 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

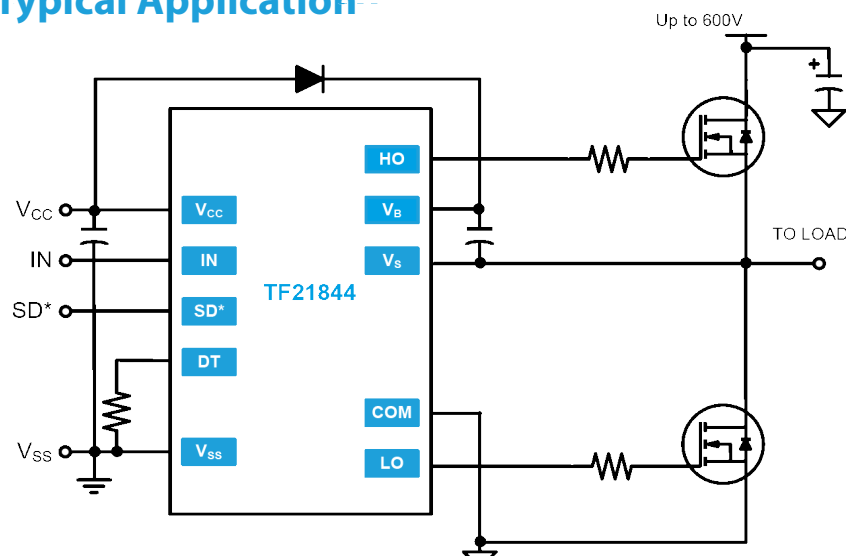


Ordering Information

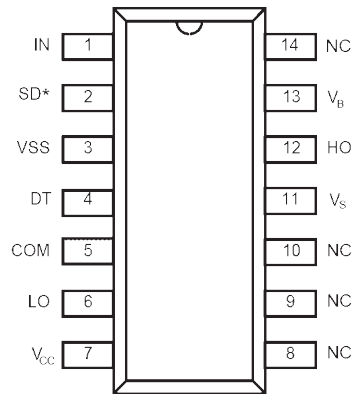
Year Year Week Week

PART NUMBER	PACKAGE	PACK / Qty	MARK
TF21844-TUU	SOIC-14(N)	Tube / 50	 YYWW TF21844 Lot ID
TF21844-TUH		T&R / 2500	
TF21844-3BS	PDIP-14	Tube / 25	 YYWW TF21844 Lot ID

Typical Application



Pin Diagrams



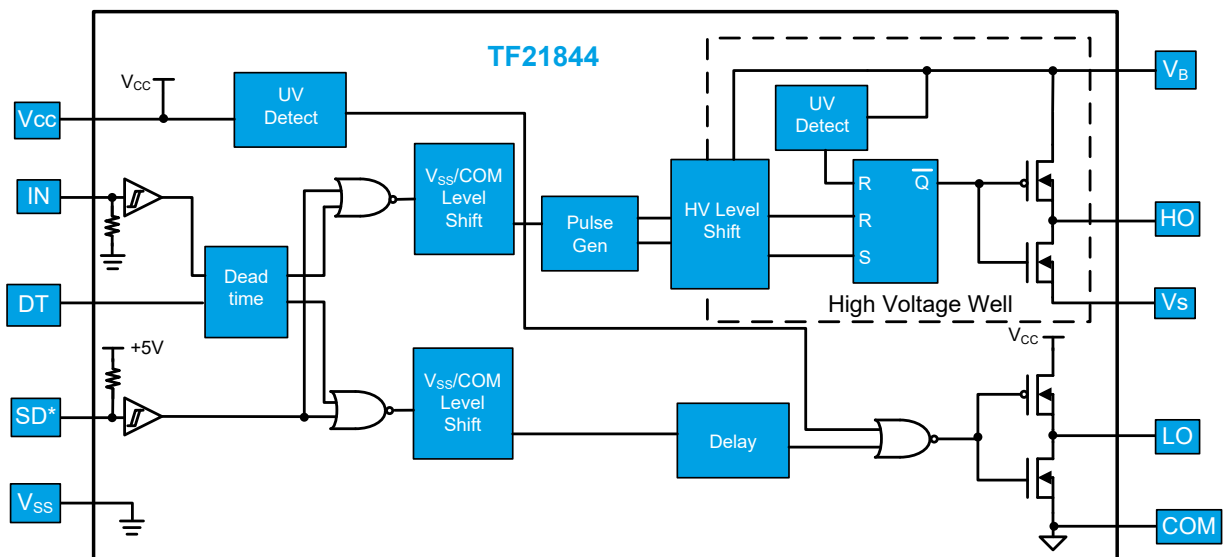
Top View: PDIP-14, SOIC-14

TF21844

Pin Descriptions

PIN NAME	PIN DESCRIPTION
IN	Logic input for high-side and low-side gate driver outputs (HO and LO), in phase with HO (referenced to VSS).
SD*	Logic input for shutdown (referenced to VSS), enabled low.
V _{SS}	Logic ground
DT	Programmable deadtime lead, referenced to VSS.
COM	Low-side return
LO	Low-side gate drive output
V _{CC}	Low-side and logic fixed supply
V _B	High-side floating supply
HO	High-side gate drive output
V _S	High-side floating supply return

Functional Block Diagram



Absolute Maximum Ratings (NOTE1)

V_B - High side floating supply voltage.....-0.3V to +624V
 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.....50 V/ns
 V_{DT} - Programmable dead time pin voltage... V_{SS} -0.3V to V_{CC} +0.3V
 V_{CC} - Logic and Low side fixed supply voltage.....-0.3V to +24V
 V_{LO} - Low side output voltage.....-0.3V to V_{CC} +0.3V
 V_{SS} - Logic supply offset voltage..... V_{CC} -24V to V_{CC} +0.3V
 V_{IN} - Logic input voltage (IN and SD*)..... V_{SS} -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-14.....1.0W
 PDIP-14.....1.6W

SOIC-14 Thermal Resistance (NOTE2)
 θ_{JA}120 $^\circ\text{C}/\text{W}$
PDIP-14 Thermal Resistance (NOTE2)
 θ_{JA}75 $^\circ\text{C}/\text{W}$

T_J - Junction operating temperature+150 $^\circ\text{C}$
 T_L - Lead temperature (soldering, 10s) +300 $^\circ\text{C}$
 T_{stg} - Storage temperature range-55 $^\circ\text{C}$ to +150 $^\circ\text{C}$

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	600	V
V_{HO}	High side floating output voltage	V_S	V_B	V
V_{CC}	Logic and Low side fixed supply voltage	10	20	V
V_{LO}	Low side output voltage	0	V_{CC}	V
V_{IN}	Logic input voltage (IN & SD*)	V_{SS}	5	V
V_{DT}	Programmable deadtime pin voltage	V_{SS}	V_{CC}	V
V_{SS}	Logic ground	-5	+5	V
T_A	Ambient temperature	-40	125	$^\circ\text{C}$

NOTE3 Logic operational for V_S of -5V to 600V. Logic state held for V_S of -5V to V_B .

DC Electrical Characteristics *(NOTE4)*

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

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
V_{IH}	Logic "1" input voltage for HO & logic "0" for LO	$V_{CC} = 10\text{ V to }20\text{ V}$ Note5	2.5			V
V_{IL}	Logic "0" input voltage for HO & logic "1" for LO				0.8	
$V_{SD, TH+}$	SD* input positive going threshold		2.5			
$V_{SD, TH-}$	SD* input negative going threshold				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	$V_B = V_S = 600V$			50	μA
I_{BSO}	Quiescent V_{BS} supply current	$V_{IN} = 0V$ or $5V$	20	60	150	
I_{CCQ}	Quiescent V_{CC} supply current	$V_{IN} = 0V$ or $5V$	0.4	1.0	1.8	mA
I_{IN+}	Logic "1" input bias current	$I_N = 5V$, $SD^* = 0V$		25	60	μA
I_{IN-}	Logic "0" input bias current	$I_N = 0V$, $SD^* = 5V$			1.0	
V_{BSUV+}	V_{BS} supply under-voltage positive going threshold		8	8.9	9.8	V
V_{BSUV-}	V_{BS} supply under-voltage negative going threshold		7.4	8.2	9	
V_{CCUV+}	V_{CC} supply under-voltage positive going threshold		8	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	$V_O = 0V$, $PW \leq 10\text{ }\mu s$	1.4	1.9		A
I_{O-}	Output low short circuit pulsed current	$V_O = 15V$, $PW \leq 10\text{ }\mu s$	1.7	2.3		

Note4 The V_{IN} , V_{TH} , I_{IN} parameters are referenced to V_{SS} and are applicable to the two logic input pins: I_N and SD^* . The V_O and I_O parameters are referenced to COM and are applicable to the respective output pins: HO and LO .

Note5 For optimal operation, it is recommended that the input pulse (to I_N and SD^*) should have an amplitude of 2.5V minimum with a pulse width of 800ns minimum

AC Electrical Characteristics

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

Symbol	Parameter	Conditions	MIN	TYP	MAX	Unit
t_{ON}	Turn-on propagation delay	$V_S = 0V$		680	900	ns
t_{OFF}	Turn-off propagation delay	$V_S = 0V \text{ or } 600V$		270	400	
t_{SD}	Shut-down propagation delay			180	270	
$t_{DM ON}$	Delay matching, HS & LS turn-on				90	
$t_{DM OFF}$	Delay matching, HS & LS turn-off				40	
t_r	Turn-on rise time	$V_S = 0V$		40	60	
t_f	Turn-off fall time			20	35	
t_{DT}	Deadtime: $t_{DT LO-HO}$ & $t_{DT HO-LO}$	$R_{DT} = 0\Omega$	280	400	520	ns
		$R_{DT} = 200k\Omega$	4	5	6	μs
t_{MDT}	Deadtime matching = $t_{DT LO-HO} - t_{DT HO-LO}$	$R_{DT} = 0\Omega$		0	50	ns
		$R_{DT} = 200k\Omega$		0	600	

Timing Waveforms

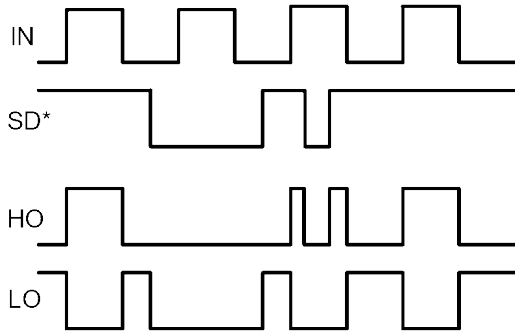


Figure 1. Input / Output Timing Diagram

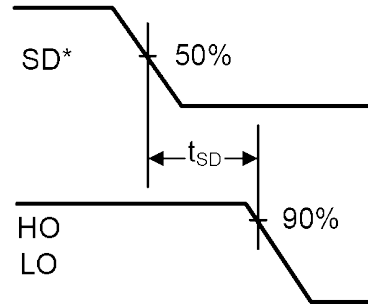
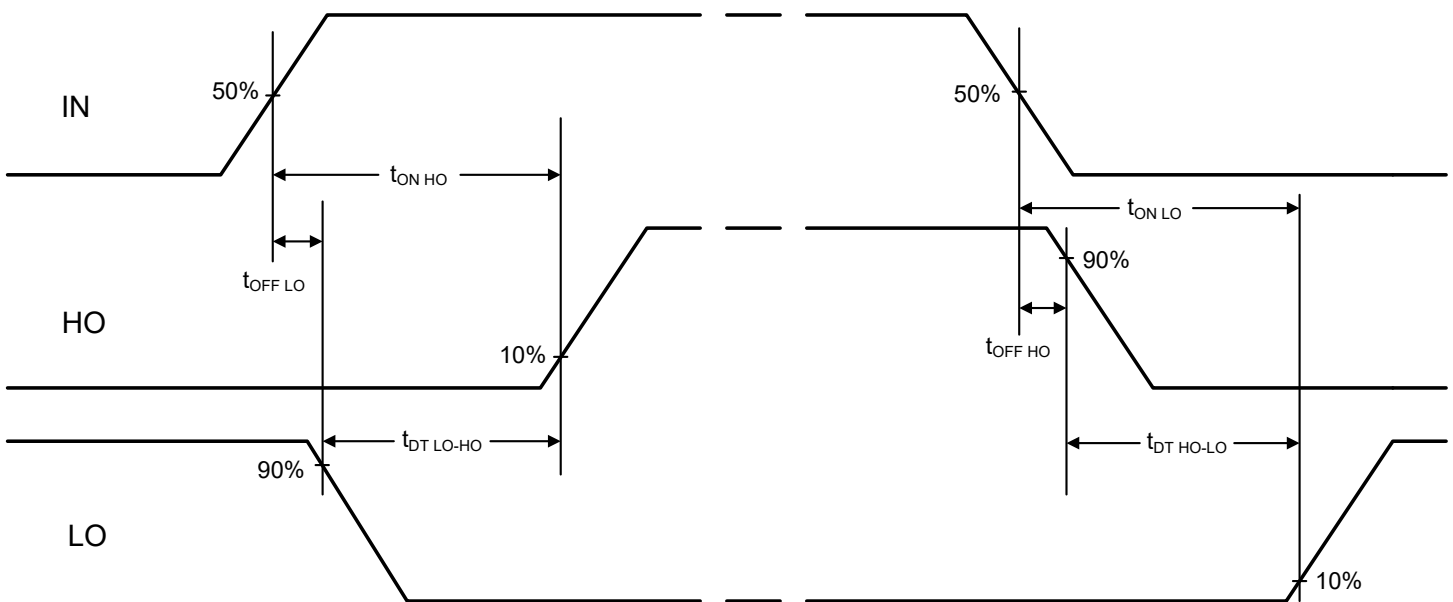


Figure 2. Shutdown Waveform Definitions



Deadtime $t_{DT\ LO-HO} = t_{ON\ HO} - t_{OFF\ LO}$
 $t_{DT\ HO-LO} = t_{ON\ LO} - t_{OFF\ HO}$

Deadtime matching
 $t_{MDT} = t_{DT\ LO-HO} - t_{DT\ HO-LO}$

Delay matching
 $t_{DM\ OFF} = t_{OFF\ LO} - t_{OFF\ HO}$
 $t_{DM\ ON} = t_{ON\ LO} - t_{ON\ HO}$

Figure 3. Switching Time Waveform Definitions

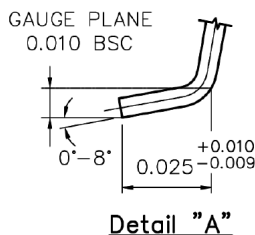
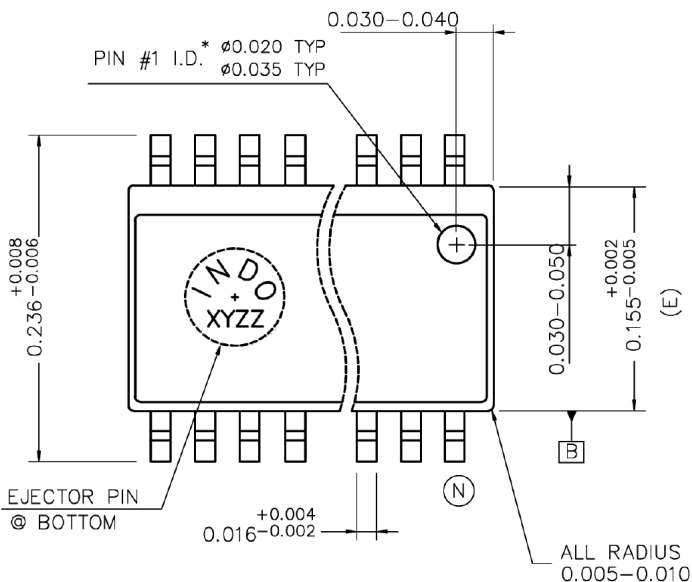
Package Dimensions (SOIC-14)

Please contact support@tfsemi.com for package availability.

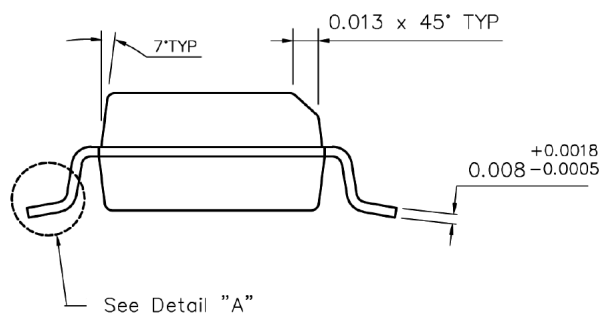
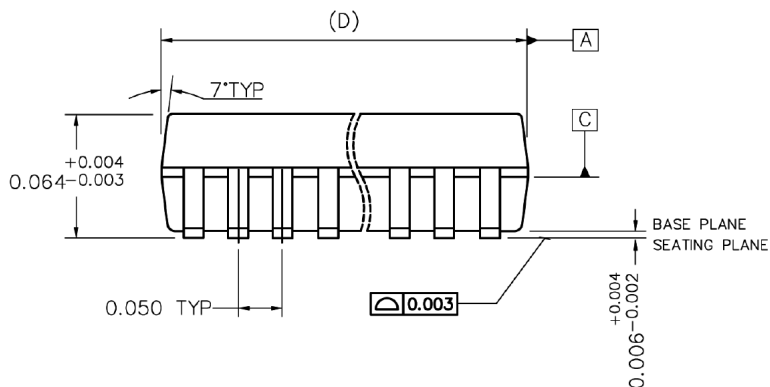
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED

NOTES:

1. "D" & "E" ARE REFERENCE DATUMS AND DO NOT INCLUDE MOLD FLASH OR PROTRUSION. MOLD FLASH OR PROTRUSION SHALL NOT EXCEED 6 MILS PER SIDE.
2. "N" IS THE NUMBER OF TERMINAL POSITIONS.
3. FORMED LEADS SHALL BE PLANAR WITH RESPECT TO ONE ANOTHER WITHIN 3 MIL (⊙ SEATING PLANE) OUTGOING ASSEMBLY & 4 MILS AFTER TEST.
4. THE BOTTOM PACKAGE LEAD SIDE MAY BE BIGGER THAN THE TOP PACKAGE LEAD SIDE BY 4 MILS (2 MILS PER SIDE). BOTTOM PACKAGE DIMENSION SHALL FOLLOW DIMENSION STATED IN THIS DRAWING.
5. THE BOTTOM EJECTOR PIN CONTAINS COUNTRY OF ORIGIN "INDO" AND MOLD ID. (REFER TO TABLE FOR OPTION).
6. THIS DRAWING CONFORMS TO JEDEC REF. MS-012 REV. E



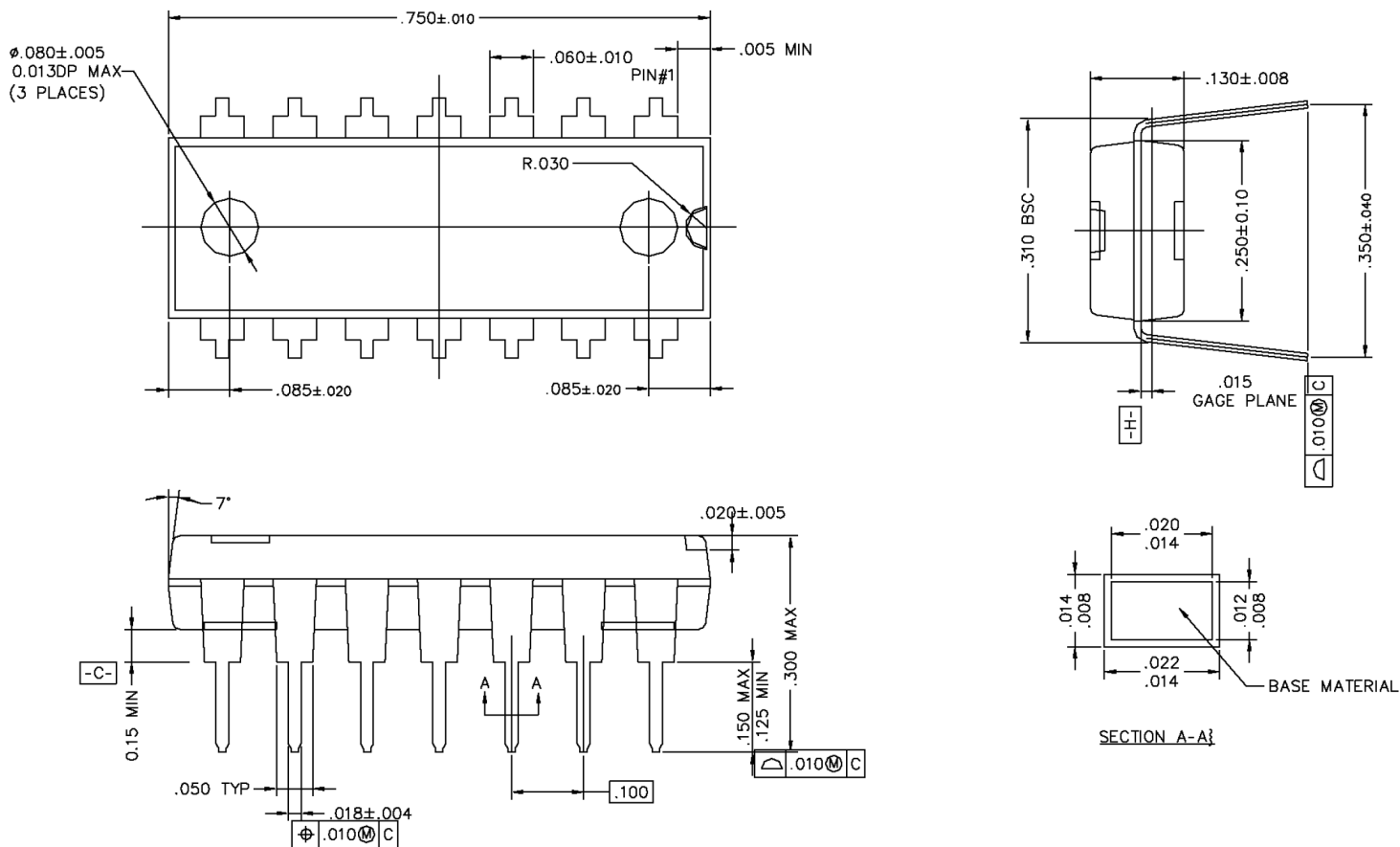
N	D VARIATION			MGP MOLD			
	MIN	NOM	MAX	PIN 1 I.D.	EJECT PIN	PIN 1 I.D.	EJECT PIN
08	0.189	0.193	0.196	N/A		YES	YES
14	0.337	0.339	0.344	YES	NO	YES	YES
16	0.386	0.390	0.393	N/A		YES	YES



Package Dimensions (PDIP-14)

Please contact support@tfsemi.com for package availability.

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED



Note: Drawing conforms to jedec ref. MS-001 rev D

Revision History

Rev.	Change	Owner	Date
1.0	First release, Advance Info ds	Keith Spaulding	7/8/2014
1.1	Text edit	Keith Spaulding	7/17/2017
1.2	Add Note 5	Duke Walton	7/22/2019

Important Notice

TF Semiconductor Solutions (TFSS) PRODUCTS ARE NEITHER DESIGNED NOR INTENDED FOR USE IN MILITARY AND/OR AEROSPACE, AUTOMOTIVE OR MEDICAL DEVICES OR SYSTEMS UNLESS THE SPECIFIC TFSS PRODUCTS ARE SPECIFICALLY DESIGNATED BY TFSS FOR SUCH USE. BUYERS ACKNOWLEDGE AND AGREE THAT ANY SUCH USE OF TFSS PRODUCTS WHICH TFSS HAS NOT DESIGNATED FOR USE IN MILITARY AND/OR AEROSPACE, AUTOMOTIVE OR MEDICAL DEVICES OR SYSTEMS IS SOLELY AT THE BUYER'S RISK.

TFSS assumes no liability for application assistance or customer product design. Customers are responsible for their products and applications using TFSS products.

Resale of TFSS products or services with statements different from or beyond the parameters stated by TFSS for that product or service voids all express and any implied warranties for the associated TFSS product or service. TFSS is not responsible or liable for any such statements.

©2019 TFSS. All Rights Reserved. Information and data in this document are owned by TFSS wholly and may not be edited, reproduced, or redistributed in any way without the express written consent from TFSS.

For additional information please contact support@tfsemi.com or visit www.tfsemi.com.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [Gate Drivers](#) category:

Click to view products by [TFSS](#) manufacturer:

Other Similar products are found below :

[00053P0231](#) [56956](#) [57.404.7355.5](#) [LT4936](#) [57.904.0755.0](#) [5882900001](#) [00600P0005](#) [5951900000](#) [0131700000](#) [00-2240](#) [LTP70N06](#)
[LVP640](#) [5J0-1000LG-SIL](#) [LY2-US-AC240](#) [LY3-UA-DC24](#) [00576P0020](#) [LZNQ2-US-DC12](#) [LZP40N10](#) [0207100000](#) [0207400000](#)
[60100564](#) [60249-1-CUT-TAPE](#) [0134220000](#) [6035](#) [60713816](#) [M15730061](#) [61161-90](#) [61278-0020](#) [6131-204-23149P](#) [6131-205-17149P](#)
[6131-209-15149P](#) [6131-218-17149P](#) [6131-220-21149P](#) [6131-260-2358P](#) [6131-265-11149P](#) [CS1HCPU63](#) [6150300002](#) [6150-5001](#) [CSK-38-](#)
[60006](#) [CSK-38-60008](#) [621A](#) [622-4053LF](#) [6273](#) [M37730026](#) [M40N08MA-H](#) [M55155/29XH06](#) [64-807](#) [65003](#) [65-1930-6](#) [M82310002](#)