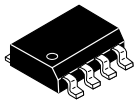
Half-Bridge Gate Driver

FL73282



SOIC8
CASE 751EB

Description

The FL73282, a monolithic half bridge gate−drive IC, can drive MOSFETs and IGBTs that operate up to +900 V. **onsemi**'s high−voltage process and common mode noise canceling technique provides stable operation of the high−side driver under high−dV_S/dt noise circumstances. An advanced level−shift circuit allows high−side gate driver operation up to V_S = −9.8 V (typical) for V_{BS} = 15 V. The UVLO circuits for both channels prevent malfunction when V_{CC} or V_{BS} is lower than the specified threshold voltage. Output drivers typically source/sink 350 mA / 650 mA, respectively, which is suitable for all kinds of half− and full−bridge inverters.

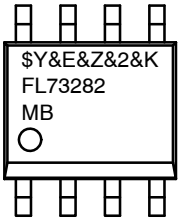
Features

- Floating Channel for Bootstrap Operation to +900 V
- Typically 350 mA / 650 mA Sourcing/Sinking Current Driving Capability for Both Channels
- Common−Mode dv/dt Noise Canceling Circuit
- Extended Allowable Negative V_S Swing to −9.8 V for Signal Propagation at V_{CC} = V_{BS} = 15 V
- V_{CC} & V_{BS} Supply Range from 10 V to 20 V
- UVLO Functions for Both Channels
- Matched Propagation Delay Below 50 ns
- Built−in 170 ns Dead−Time
- Output in Phase with Input Signal

Applications

- Fluorescent Lamp Ballast
- HID Ballast
- SMPS
- Motor Driver
- General Purpose Half Bridge Topology

MARKING DIAGRAM



FL73282MB	= Device Code
$Y	= **onsemi** Logo
&E	= Designates Space
&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 13 of this data sheet.

APPLICATION DIAGRAM

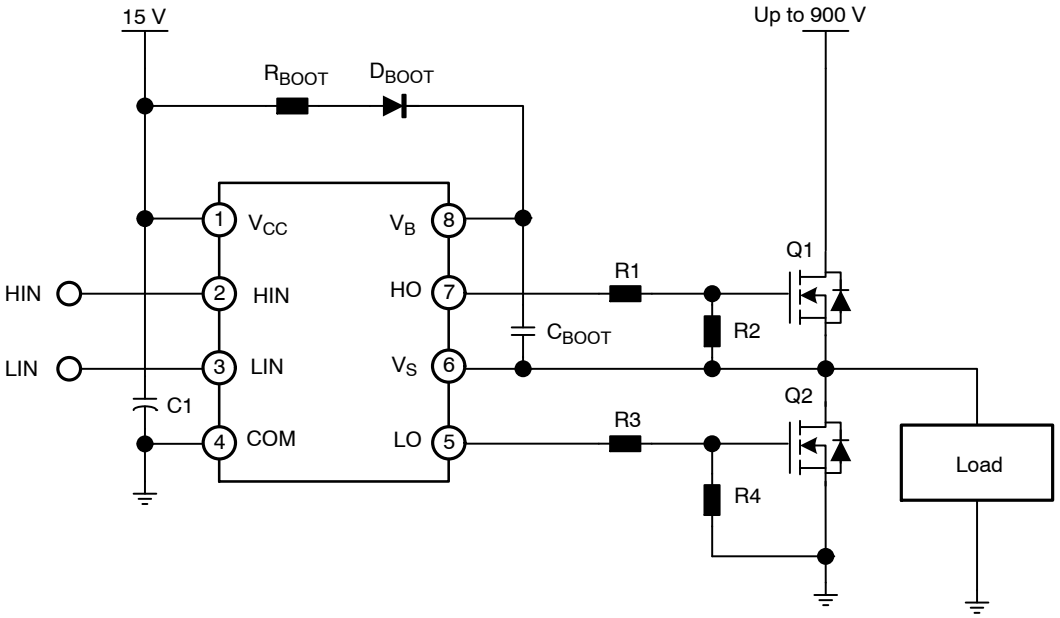


Figure 1. Application Circuit for Half Bridge Topology

BLOCK DIAGRAM

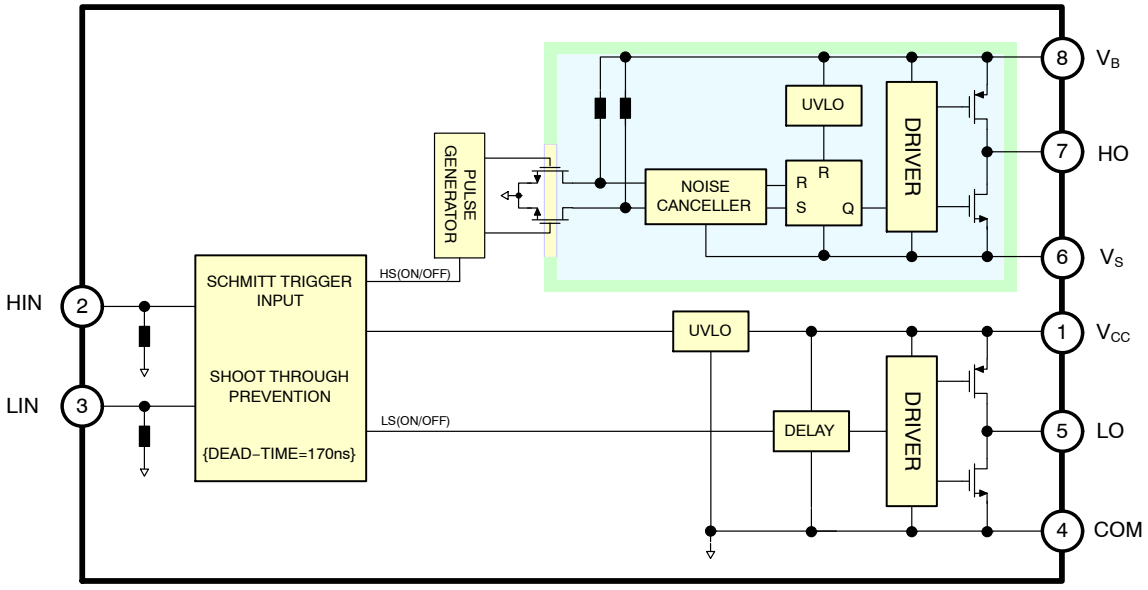


Figure 2. Functional Block Diagram

PIN CONFIGURATION

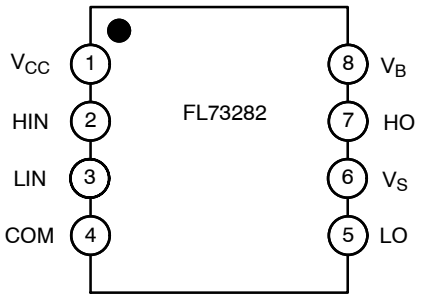


Figure 3. Pin Assignments (Top View)

PIN DEFINITIONS

Pin No.	Name	I/O	Description
1	V_{CC}	I	Low−Side Supply Voltage
2	HIN	I	Logic Input for High−Side Gate Driver Output
3	LIN	I	Logic Input for Low−Side Gate Driver Output
4	COM		Logic Ground and Low−Side Driver Return
5	LO	O	Low−Side Driver Output
6	V_S	I	High−Voltage Floating Supply Return
7	HO	O	High−Side Driver Output
8	V_B	I	High−Side Floating Supply

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Min	Max	Unit
V_S	High−Side Floating Offset Voltage	V_B−24	V_B+0.3	V
V_B	High−Side Floating Supply Voltage	−0.3	924.0	V
V_{CC}	Low−Side and Logic−Fixed Supply Voltage	−0.3	24	V
V_{HO}	High−Side Floating Output Voltage V_{HO}	V_S−0.3	V_B+0.3	V
V_{LO}	Low−Side Floating Output Voltage V_{LO}	−0.3	V_{CC}+0.3	V
V_{IN}	Logic Input Voltage (HIN, LIN)	−0.3	V_{CC}+0.3	V
COM	Logic Ground	V_{CC}−24	V_{CC}+0.3	V
dV_S/dt	Allowable Offset Voltage Slew Rate	−	±50	V/ns
P_D	Power Dissipation (Notes 2, 3, 4)	−	0.625	W
θ_{JA}	Thermal Resistance	−	200	°C/W
T_J	Junction Temperature	−	150	°C
T_{STG}	Storage Temperature	−55	150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Mounted on 76.2 x 114.3 x 1.6 mm PCB (FR−4 glass epoxy material).
2. Refer to the following standards:
   JESD51−2: Integral circuit's thermal test method environmental conditions, natural convection;
   JESD51−3: Low effective thermal conductivity test board for leaded surface−mount packages.
3. Do not exceed maximum power dissipation (P_D) under any circumstances.

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
V_B	High−Side Floating Supply Voltage	V_S+10	V_S+20	V
V_S	High−Side Floating Supply Offset Voltage	6−V_{CC}	900	V
V_{HO}	High−Side (HO) Output Voltage	V_S	V_B	V
V_{LO}	Low−Side (LO) Output Voltage	COM	V_{CC}	V
V_{IN}	Logic Input Voltage (HIN, LIN)	COM	V_{CC}	V
V_{CC}	Low−Side Supply Voltage	10	20	V
T_A	Ambient Temperature	−40	+125	°C

Functional operation above the stresses listed in the Recommended Operating Ranges is not implied. Extended exposure to stresses beyond the Recommended Operating Ranges limits may affect device reliability.

STATIC ELECTRICAL CHARACTERISTICS

$V_{BIAS}(V_{CC}, V_{BS})$ = 15.0 V, T_A = 25°C, unless otherwise specified. The V_{IN} and I_{IN} parameters are referenced to COM. The V_O and I_O parameters are referenced to V_S and COM and are applicable to the respective outputs HO and LO.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
POWER SUPPLY SECTION						
I_{QCC}	Quiescent V_{CC} Supply Current	V_{IN} = 0 V or 5 V	–	80	180	μA
I_{QBS}	Quiescent V_{BS} Supply Current	V_{IN} = 0 V or 5 V	–	50	120	μA
I_{PCC}	Operating V_{CC} Supply Current	f_{IN} = 20 kHz, rms value	–	–	550	μA
I_{PBS}	Operating V_{BS} Supply Current	f_{IN} = 20 kHz, rms value	–	–	600	μA
I_{LK}	Offset Supply Leakage Current	V_B = V_S = 900 V	–	–	10	μA
BOOTSTRAPPED SUPPLY SECTION						
V_{CCUV+} V_{BSUV+}	V_{CC} & V_{BS} Supply Under−Voltage Positive going Threshold		8.2	9.2	10.0	V
V_{CCUV-} V_{BSUV-}	V_{CC} & V_{BS} Supply Under−Voltage Negative going Threshold		7.6	8.7	9.6	V
V_{CCUVH} V_{BSUVH}	V_{CC} Supply Under−Voltage Lockout Hysteresis		–	0.5	–	V
INPUT SECTION						
V_{IH}	Logic “1” Input Voltage		2.5	–	–	V
V_{IL}	Logic “0” Input Voltage		–	–	0.8	V
I_{IN+}	Logic “1” Input Bias Current	V_{IN} = 5 V	–	20	50	μA
I_{IN-}	Logic “0” Input Bias Current	V_{IN} = 0 V	–	1.0	2.0	μA
R_{IN}	Logic Input Pull−Down Resistance		100	250	–	kΩ
GATE DRIVER OUTPUT SECTION						
V_{OH}	High−Level Output Voltage, $V_{BIAS-VO}$	I_O = 0 A	–	–	85	mV
V_{OL}	Low−Level Output Voltage, V_O	I_O = 0 A	–	–	85	mV
I_{O+}	Output HIGH Short−Circuit Pulsed Current	V_O = 0 V, V_{IN} = 5 V with PW ≤ 10 μs	250	350	–	mA
I_{O-}	Output LOW Short−Circuit Pulsed Current	V_O = 15 V, V_{IN} = 0 V with PW ≤ 10 μs	500	650	–	mA
V_S	Allowable Negative VS Pin Voltage for HIN Signal Propagation to HO		–	−9.8	−7.0	V

DYNAMIC ELECTRICAL CHARACTERISTICS

$V_{BIAS}(V_{CC}, V_{BS})$ = 15.0 V, V_S = COM, C_L = 1000 pF and T_A = 25°C, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
t_{ON}	Turn−On Propagation Delay	V_S = 0 V	80	150	220	ns
t_{OFF}	Turn−Off Propagation Delay	V_S = 0 V or 900 V (Note 4)	80	150	220	ns
t_R	Turn−On Rise Time	V_{LIN} = V_{HIN} = 5 V	–	60	140	ns
t_F	Turn−Off Fall Time	V_{LIN} = V_{HIN} = 0 V	–	30	80	ns
DT	Dead Time		70	170	270	ns
MT	Delay Matching, HS & LS Turn−on/off		–	–	50	ns
t_{PW}	Minimum Input Pulse Width that Changes the Output (Notes 4, 5)		–	–	220	ns

4. These parameters are guaranteed by design.
5. The minimum input pulse width time included dead time.

TYPICAL CHARACTERISTICS

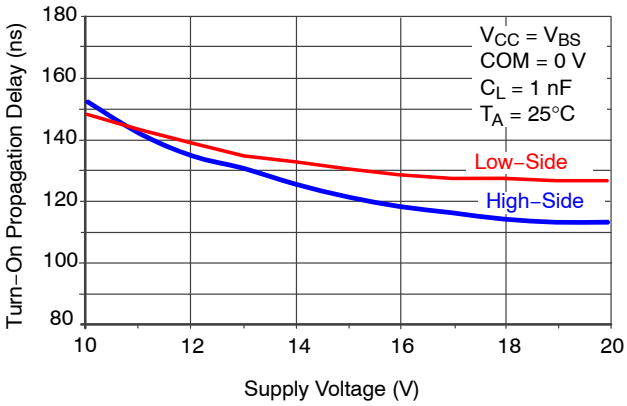


Figure 4. Turn−On Propagation Delay vs. Supply Voltage

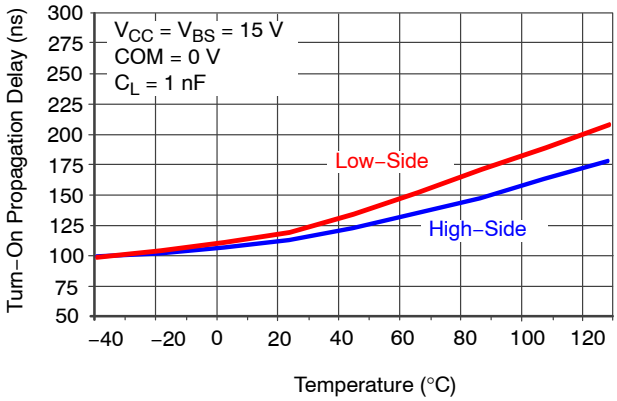


Figure 5. Turn−On Propagation Delay vs. Temperature

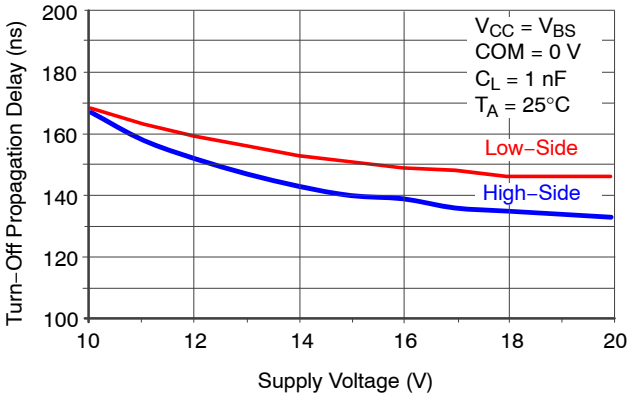


Figure 6. Turn−Off Propagation Delay vs. Supply Voltage

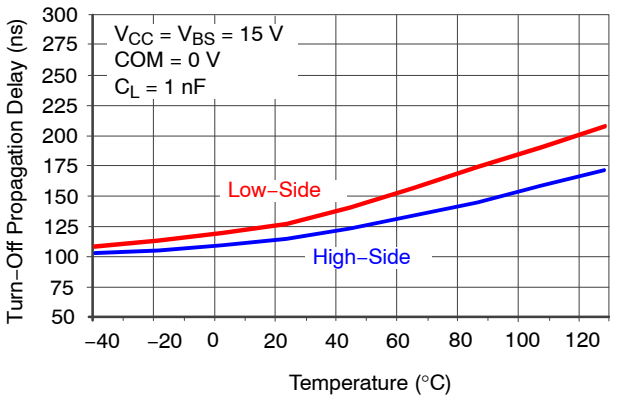


Figure 7. Turn−Off Propagation Delay vs. Temperature

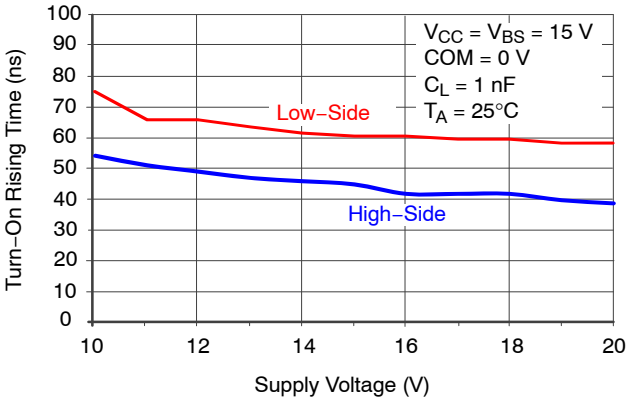


Figure 8. Turn−On Rising Time vs. Supply Voltage

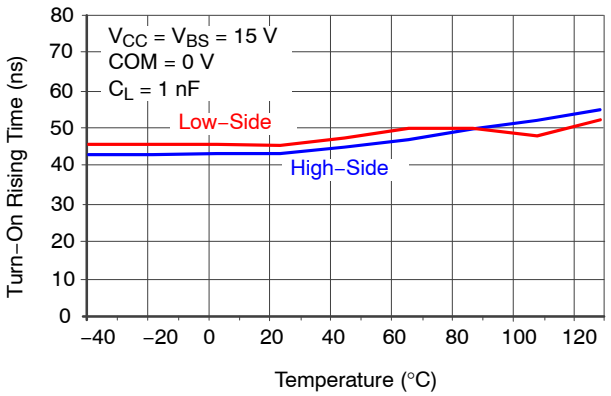


Figure 9. Turn−On Rising Time vs. Temperature

TYPICAL CHARACTERISTICS (continued)

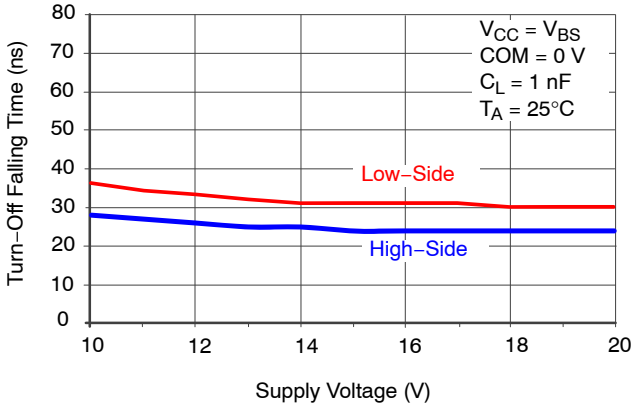


Figure 10. Turn−Off Falling Time vs. Supply Voltage

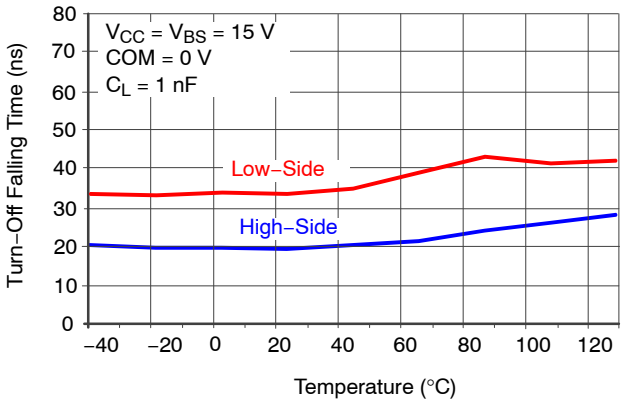


Figure 11. Turn−Off Falling Time vs. Temperature

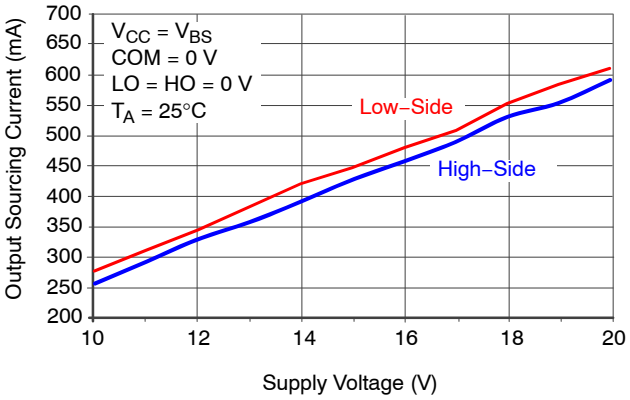


Figure 12. Output Sourcing Current vs. Supply Voltage

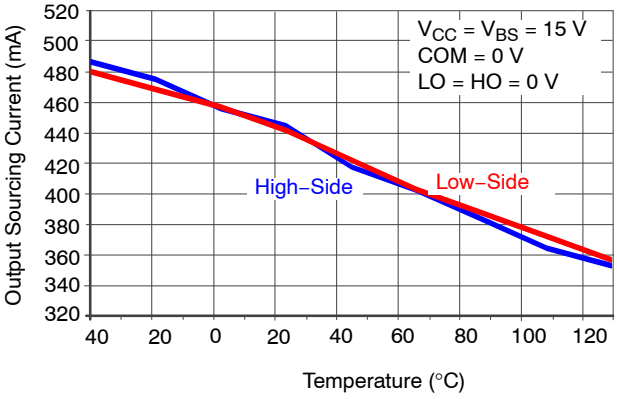


Figure 13. Output Sourcing Current vs. Temperature

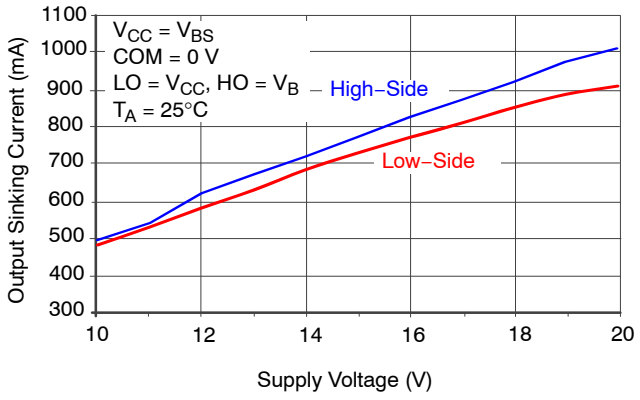


Figure 14. Output Sinking Current vs. Supply Voltage

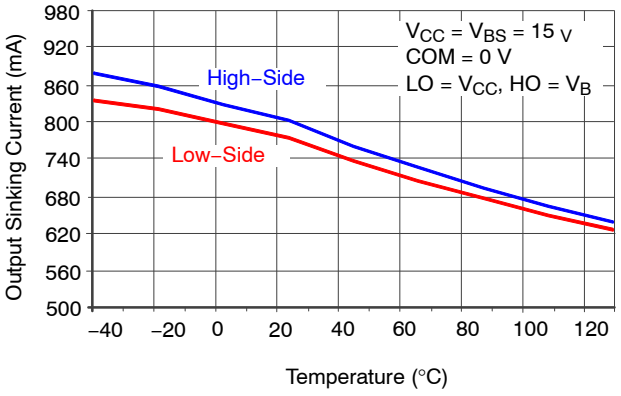


Figure 15. Output Sinking Current vs. Temperature

TYPICAL CHARACTERISTICS (continued)

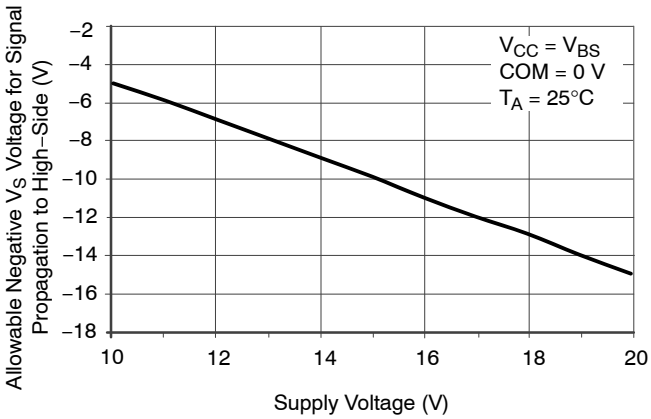


Figure 16. Allowable Negative V_S Voltage for Signal Propagation to High Side vs. Supply Voltage

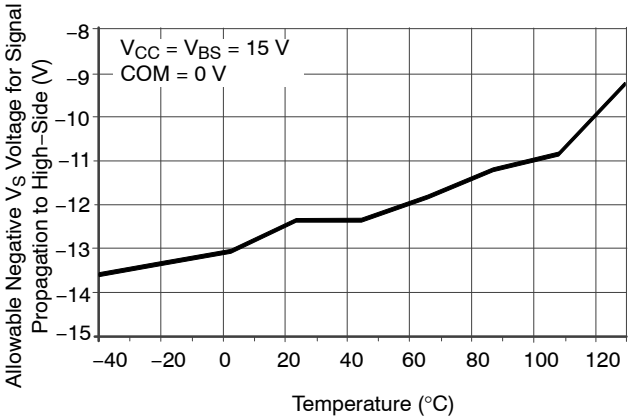


Figure 17. Allowable Negative V_S Voltage for Signal Propagation to High Side vs. Temperature

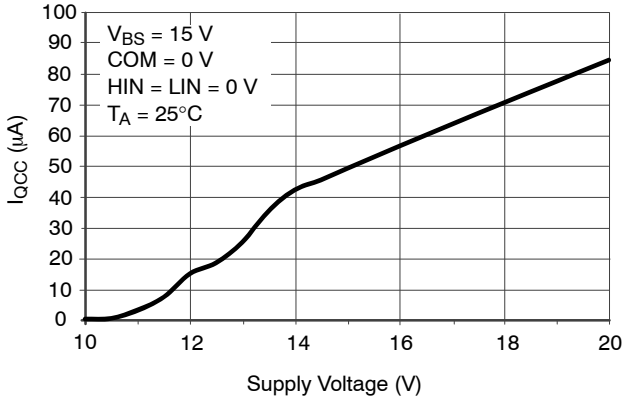


Figure 18. I_{QCC} vs. Supply Voltage

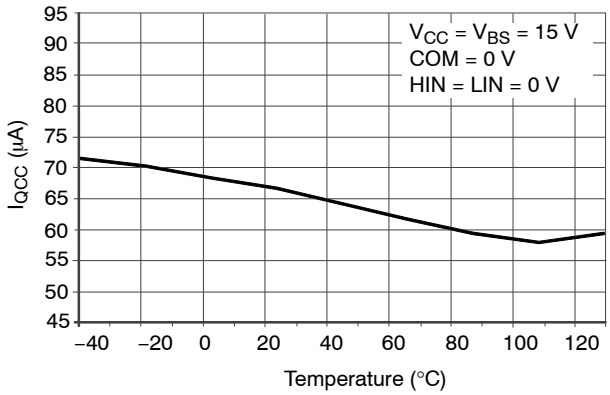


Figure 19. I_{QCC} vs. Temperature

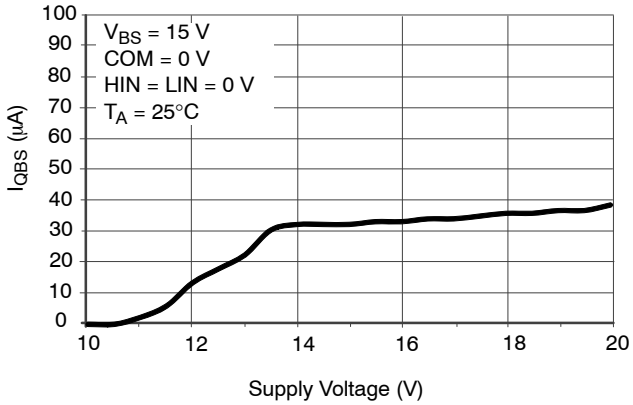


Figure 20. I_{QBS} vs. Supply Voltage

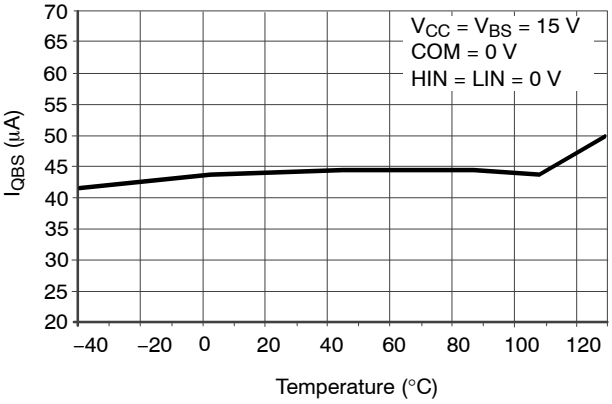


Figure 21. I_{QBS} vs. Temperature

TYPICAL CHARACTERISTICS (continued)

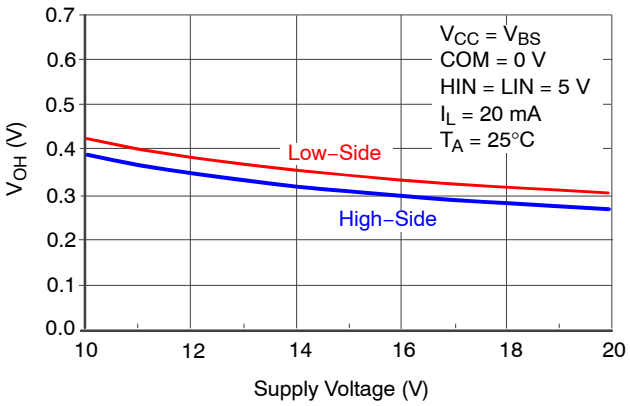


Figure 22. High−Level Output Voltage vs. Supply Voltage

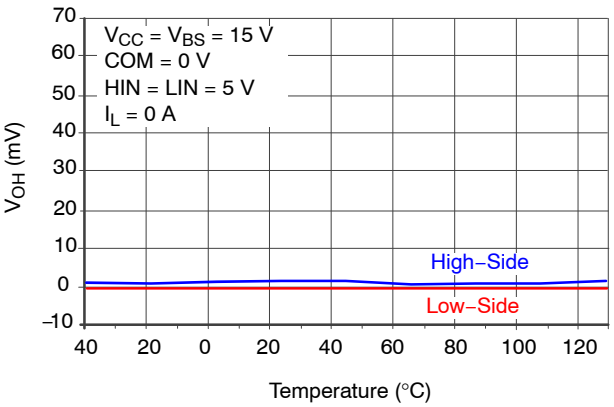


Figure 23. High−Level Output Voltage vs. Temperature

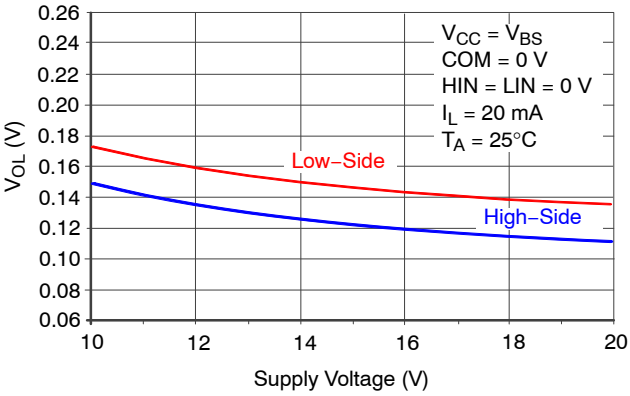


Figure 24. Low−Level Output Voltage vs. Supply Voltage

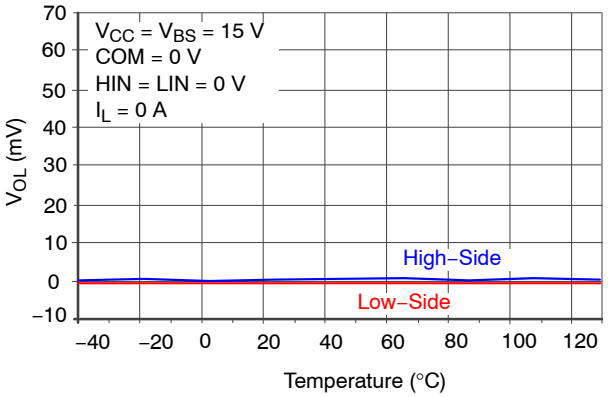


Figure 25. Low−Level Output Voltage vs. Temperature

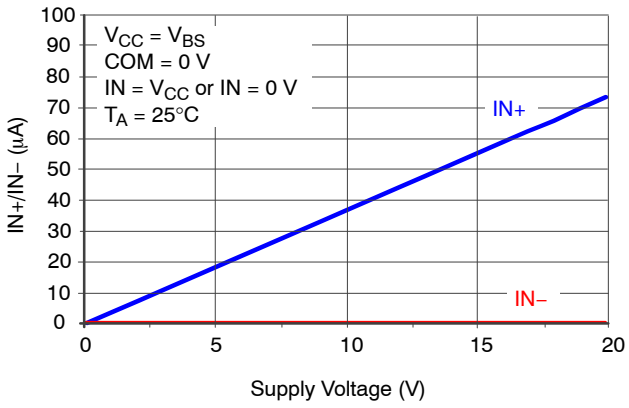


Figure 26. Input Bias Current vs. Supply Voltage

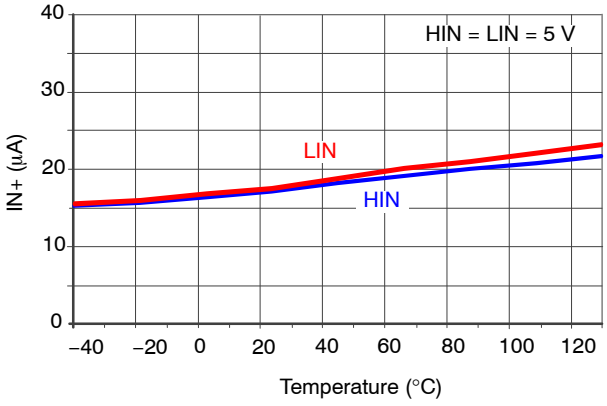


Figure 27. Input Bias Current vs. Temperature

TYPICAL CHARACTERISTICS (continued)

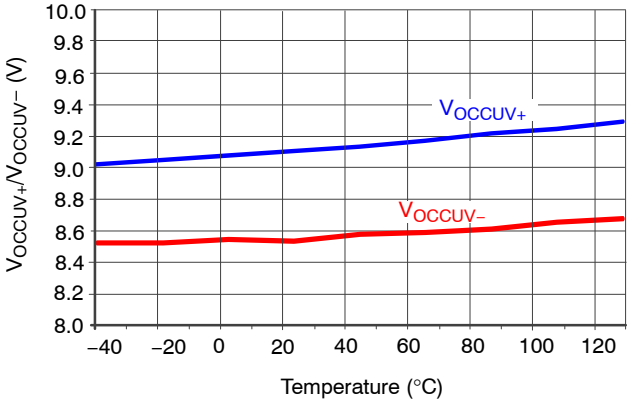


Figure 28. V_{CC} UVLO Threshold Voltage vs. Temperature

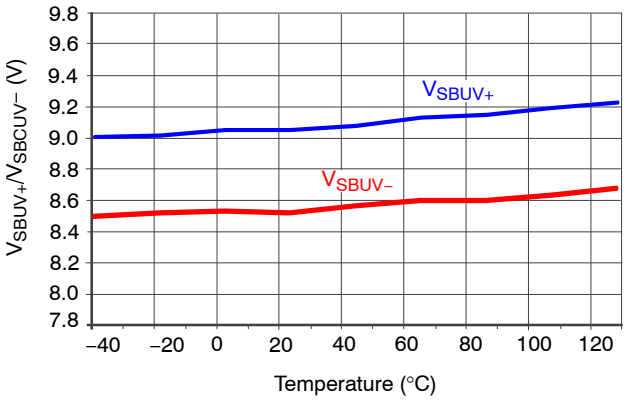


Figure 29. V_{BS} UVLO Threshold Voltage vs. Temperature

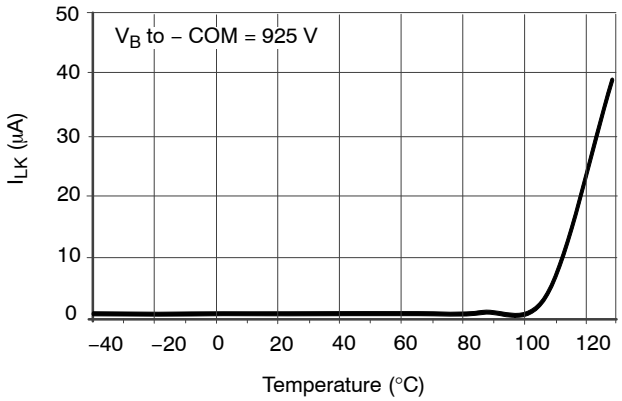


Figure 30. V_B to COM Leakage Current vs. Temperature

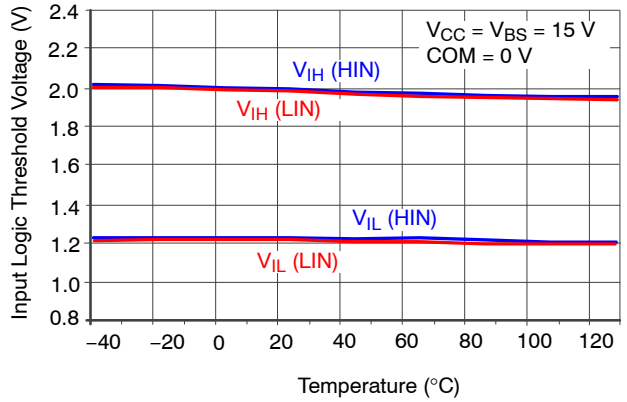


Figure 31. Input Logic Threshold Voltage vs. Temperature

SWITCHING TIME DEFINITIONS

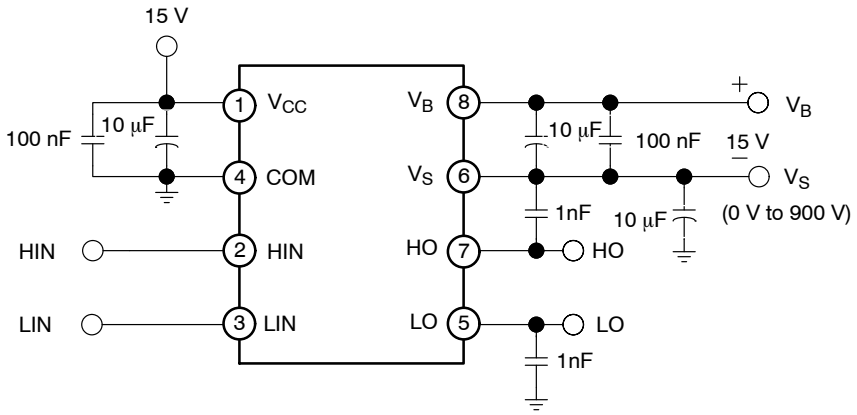


Figure 32. Switching Time Test Circuit

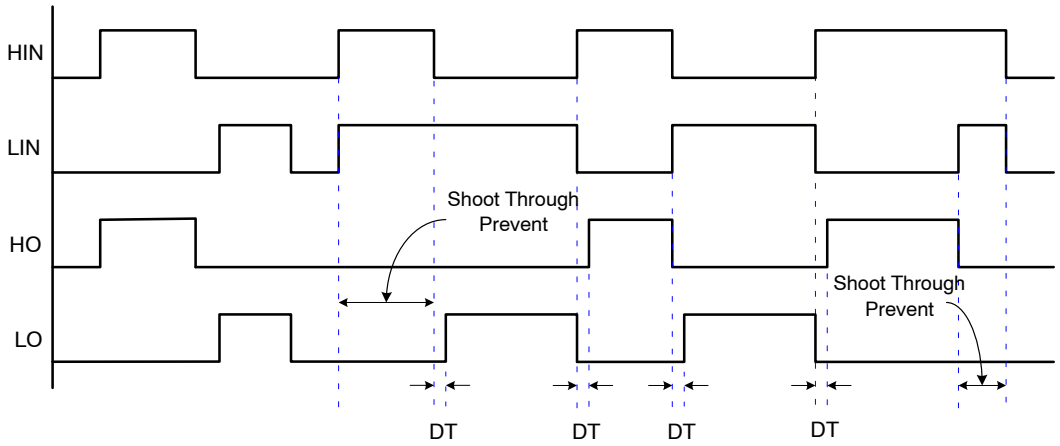


Figure 33. Input / Output Timing Diagram

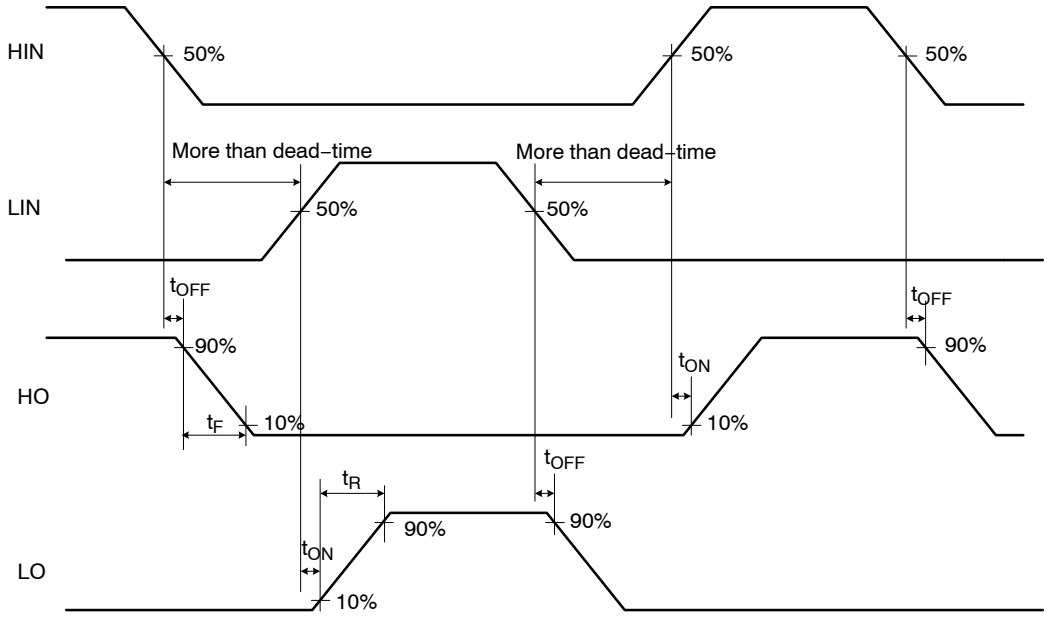


Figure 34. Switching Time Definition

SWITCHING TIME DEFINITIONS (continued)

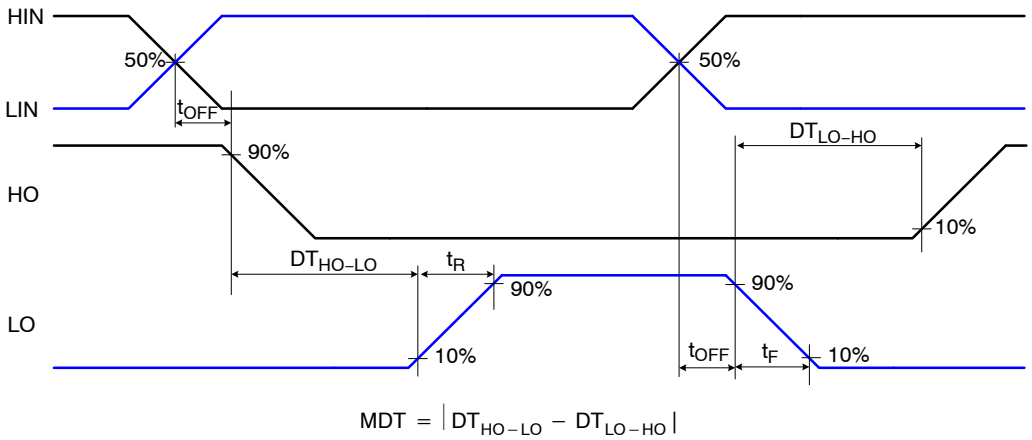


Figure 35. Internal Dead Time Definition

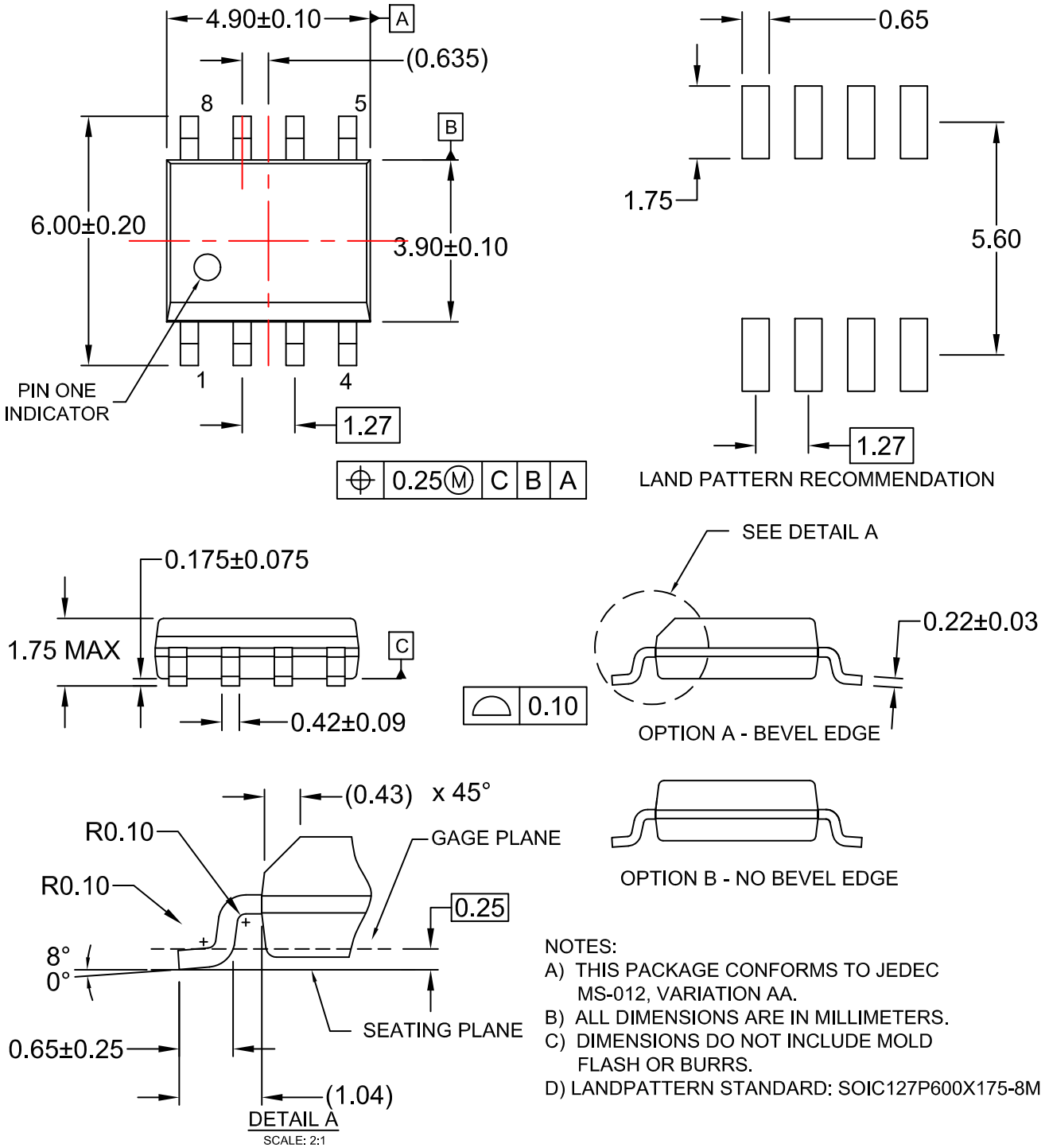
ORDERING INFORMATION

Part Number	Operating Temperature Range	Package	Shipping†
FL73282MX (Note 6)	−40°C to +125°C	8−Lead, Small Outline Integrated Circuit, (SOIC), (Pb−Free)	2500 / Tape & Reel

6. These devices passed wave−soldering test by JESD22A−111.

SOIC8
CASE 751EB
ISSUE A

DATE 24 AUG 2017



NOTES:
A) THIS PACKAGE CONFORMS TO JEDEC MS-012, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONS DO NOT INCLUDE MOLD FLASH OR BURRS.
D) LANDPATTERN STANDARD: SOIC127P600X175-8M

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