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## NTE7226 Integrated Circuit High Voltage, High Speed MOSFET/IGBT Driver w/High and Low Side Outputs 14-Lead DIP Type Package

**Description:**

The NTE7226 is a high voltage, high speed power MOSFET and IGBT driver with independent high and low side referenced output channels in a 14-Lead DIP type package. HVIC and latch immune CMOS technologies enable ruggedized monolithic construction. 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. The floating channel can be used to drive an N-Channel power MOSFET or IGBT in the high side configuration which operates up to 500 volts.

**Features:**

- Floating Channel Designed for Bootstrap Operation  
 Fully Operational to +500V  
 Tolerant to Negative Transient Voltage  
 dV/dt Immune
- Gate Drive Supply Range from 10V to 20V
- Undervoltage Lockout for Both Channels
- 3.3V Logic Compatible  
 Separate Logic Supply Range from 3.3V to 20V  
 Logic an Power Ground  $\pm 5V$  Offset
- CMOS Schmitt-Triggered Inputs with Pull-Down
- Cycle by Cycle Edge-Triggered Shutdown Logic
- Matched Propagation Delay for Both Channels
- Outputs in Phase with Inputs

**Absolute Maximum Ratings:** (Note 1)

High Side Floating Supply Voltage, $V_B$ .....	-0.3 to 525V
High Side Floating Supply Offset Voltage, $V_S$ .....	$V_B - 25$ to $V_B + 0.3V$
High Side Floating Output Voltage, $V_{HO}$ .....	$V_S - 0.3$ to $V_B + 0.3V$
Low Side Fixed Supply Voltage, $V_{CC}$ .....	-0.3 to +25V
Low Side Output Voltage, $V_{LO}$ .....	-0.3 to $V_{CC} + 0.3V$
Logic Supply Voltage, $V_{DD}$ .....	-0.3 to $V_{SS} + 25V$
Logic Supply Offset Voltage, $V_{SS}$ .....	$V_{CC} - 25$ to $V_{CC} + 0.3V$
Logic Input Voltage (HIN, LIN, & SD), $V_{IN}$ .....	$V_{SS} - 0.3$ to $V_{DD} + 0.3V$
Maximum Allowable Offset Supply Voltage Transient, $dV_S/dt$ .....	50V/ns
Package Power Dissipation ( $T_A \leq +25^\circ C$ ), $P_D$ .....	1.6W

Note 1. Absolute Maximum Ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to COM. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

**Absolute Maximum Ratings (Cont'd):** (Note 1)

Operating Junction Temperature, $T_J$ .....	+150°C
Storage Temperature Range, $T_{stg}$ .....	-55° to +150°C
Thermal Resistance, Junction-to-Ambient, $R_{thJA}$ .....	75°C/W
Lead Temperature (During Soldering, 10sec), $T_L$ .....	+300°C

Note 1. Absolute Maximum Ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to COM. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

**Recommended Operating Conditions:** (Note 2)

Parameter	Symbol	Min	Max	Unit
High Side Floating Supply Absolute Voltage	$V_B$	$V_S + 10$	$V_S + 20$	V
High Side Floating Supply Offset Voltage	$V_S$	Note 3	500	V
High Side Floating Output Voltage	$V_{HO}$	$V_S$	$V_B$	V
Low Side Fixed Supply Voltage	$V_{CC}$	10	20	V
Low Side Output Voltage	$V_{LO}$	0	$V_{CC}$	V
Logic Supply Voltage	$V_{DD}$	$V_{SS} + 3$	$V_{SS} + 20$	V
Logic Supply Offset Voltage	$V_{SS}$	-5 (Note 4)	5	V
Logic Input Voltage (HIN, LIN, & SD)	$V_{IN}$	$V_{SS}$	$V_{DD}$	V
Ambient Temperature	$T_A$	-40	+125	°C

Note 2. For proper operation, the device should be used within the recommended conditions. The  $V_S$  and  $V_{SS}$  offset ratings are tested with all supplies biased at 15V differential.

Note 3. Logic operational for  $V_S$  of -4V to +500V. Logic state held for  $V_S$  of -4V to  $-V_{BS}$ .

Note 4. When  $V_{DD} < 5V$ , the minimum  $V_{SS}$  offset is limited to  $-V_{DD}$ .

**Electrical Characteristics:** ( $V_{BIAS}$  ( $V_{CC}$ ,  $V_{BS}$ ,  $V_{DD}$ ) = 15V,  $V_{SS}$  = COM,  $T_A$  = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Dynamic Characteristics</b> ( $C_L = 1000pF$ )						
Turn-On Propagation Delay	$t_{on}$	$V_S = 0V$	-	120	150	ns
Turn-Off Propagation Delay	$t_{off}$	$V_S = 500V$	-	94	125	ns
Shutdown Propagation Delay	$t_{sd}$	$V_S = 500V$	-	110	140	ns
Turn-On Rise Time	$t_r$		-	25	35	ns
Turn-Off Fall Time	$t_f$		-	17	25	ns
Delay Matching, HS & LS Turn-On/Off	MT		-	-	10	ns
<b>Static Characteristics</b> (Note 5)						
Logic "1" Input Voltage	$V_{IH}$		9.5	-	-	V
Logic "0" Input Voltage	$V_{IL}$		-	-	6.0	V
High Level Output Voltage, $V_{BIAS} - V_O$	$V_{OH}$	$I_O = 0A$	-	-	1.2	V
Low Level Output Voltage, $V_O$	$V_{OL}$	$I_O = 0A$	-	-	0.1	V
Offset Supply Leakage Current	$I_{LK}$	$V_B = V_S = 500V$	-	-	50	μA
Quiescent $V_{BS}$ Supply Current	$I_{QBS}$	$V_{IN} = 0V$ or $V_{DD}$	-	125	230	μA
Quiescent $V_{CC}$ Supply Current	$I_{QCC}$	$V_{IN} = 0V$ or $V_{DD}$	-	180	340	μA
Quiescent $V_{DD}$ Supply Current	$I_{QDD}$	$V_{IN} = 0V$ or $V_{DD}$	-	15	30	μA

Note 5. The  $V_{IN}$ ,  $V_{TH}$ , and  $I_{IN}$  parameters are referenced for  $V_{SS}$  and are applicable to all three logic input leads: HIN, LIN and SD. The  $V_O$  and  $I_O$  parameters re referenced to COM and are applicable to the respective output leads: HO or LO.

**Electrical Characteristics (Cont'd):** ( $V_{BIAS}$  ( $V_{CC}$ ,  $V_{BS}$ ,  $V_{DD}$ ) = 15V,  $V_{SS}$  = COM,  $T_A$  = +25°C unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics (Cont'd)</b> (Note 5)						
Logic "1" Input Bias Current	$I_{IN+}$	$V_{IN} = V_{DD}$	-	20	40	$\mu A$
Logic "0" Input Bias Current	$I_{IN-}$	$V_{IN} = 0V$	-	-	1.0	$\mu A$
$V_{BS}$ Supply Undervoltage Positive Going Threshold	$V_{BSUV+}$		7.5	8.6	9.7	V
$V_{BS}$ Supply Undervoltage Negative Going Threshold	$V_{BSUV-}$		7.0	8.2	9.4	V
$V_{CC}$ Supply Undervoltage Positive Going Threshold	$V_{CCUV+}$		7.4	8.5	9.6	V
$V_{CC}$ Supply Undervoltage Negative Going Threshold	$V_{CCUV-}$		7.0	8.2	9.4	V
Output High Short Circuit Pulsed Current	$I_{O+}$	$V_O = 0V$ , $V_{IN} = V_{DD}$ , $PW \leq 10\mu s$	2.0	2.5	-	A
Output Low Short Circuit Pulsed Current	$I_{O-}$	$V_O = 15V$ , $V_{IN} = V_{DD}$ , $PW \leq 10\mu s$	2.0	2.5	-	A

Note 5. The  $V_{IN}$ ,  $V_{TH}$ , and  $I_{IN}$  parameters are referenced for  $V_{SS}$  and are applicable to all three logic input leads: HIN, LIN and SD. The  $V_O$  and  $I_O$  parameters re referenced to COM and are applicable to the respective output leads: HO or LO.

**Pin Definitions:**

Symbol	Description
$V_{DD}$	Logic Supply
HIN	Logic Input for High Side Gate Driver Output (HO), In Phase
SD	Logic Input for Shutdown
LIN	Logic Input for Low Side gate Driver Output (LO), In Phase
$V_{SS}$	Logic Ground
$V_B$	High Side Floating Supply
HO	High Side Gate Drive Output
$V_S$	High Side Floating Supply Return
$V_{CC}$	Low Side Supply
LO	Low Side Gate Drive Output
COM	Low Side Return



