January 1996, Rev C FN7299

100V Half Bridge Driver

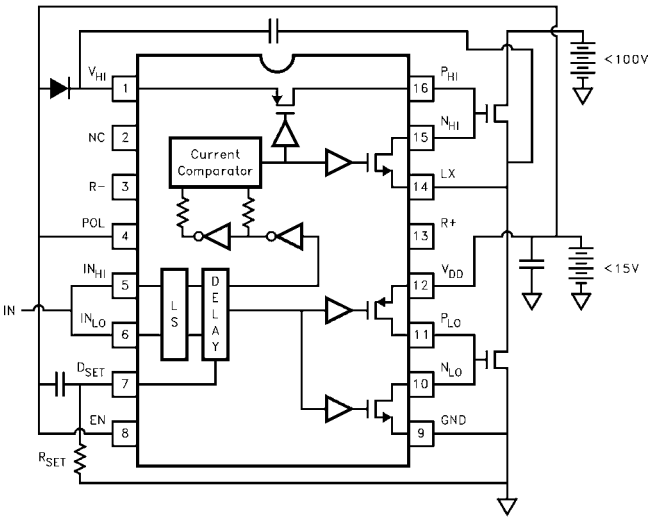
élantec

The EL7761 provides a low cost solution to many half bridge applications. The EL7761 is DC coupled so that there are no start up problems associated with AC coupled schemes. A single resistor from D_{SET} to GND provides “dead time” programmability. Shorting D_{SET} to V_{DD} gives the shortest delay (~100ns).

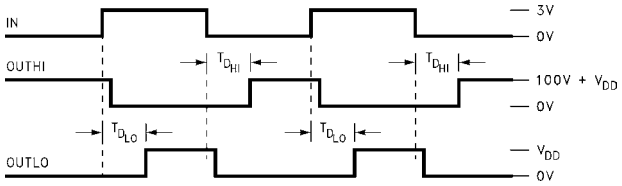
The POL pin controls the polarity of the low side driver. The polarity of the upper driver is always inverting. The EN pin, when low, forces the high and low side outputs into their low state.

Pinout

EL7761
(16-PIN PDIP, SOIC)
TOP VIEW



EL7761 WAVEFORM EXAMPLE



$T_{DLO} = T_{DHI}$
$POL = V_{DD}$

Features

- 100V High Side Voltage
- Programmable Delay
- Direct Coupled
- No Start Up Ambiguity
- Rail to Rail Output
- 1MHz Operation
- Shutdown Function
- 1.0 Amp Peak Current
- Improved Response Times
- Matched Rise and Fall Times
- Low Supply Current
- Low Output Impedance
- Low Input Capacitance

Applications

- Uninterruptible Power Supplies
- Distributed Power Systems
- IGBT Drive
- DC-DC Converters
- Motor Control
- Power MOSFET Drive
- Switch Mode Power Supplies

Ordering Information

PART NUMBER	TEMP. RANGE	PACKAGE	PKG. NO.
EL7761CN	-40°C to +85°C	16-Pin PDIP	MDP0031
EL7761CS	-40°C to +85°C	16-Pin SOIC	MDP0027(Note)

NOTE: Contact factory

	POL	POLARITY
Low Side	GND V_{DD}	Inverting Non-Inverting
Hi Side	X	Inverting

Absolute Maximum Ratings (T_A = 25°C)

Supply (V_{HI} to GND) 100V
Supply (V_{DD} to GND) 16.5V
Input Pins. . . . . -0.3V below GND,
. . . . . .+0.3V above V_{DD}
Peak Current per Output 2A

Storage Temperature Range . . . . . .-65°C to +150°C
Ambient Operating Temperature . . . . . .-40°C to +85°C
Operating Junction Temperature . . . . . .125°C
Power Dissipation
SOIC 1100mW
PDIP 1800mW

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

IMPORTANT NOTE: All parameters having Min/Max specifications are guaranteed. Typical values are for information purposes only. Unless otherwise noted, all tests are at the specified temperature and are pulsed tests, therefore: $T_J = T_C = T_A$

DC Electrical Specifications

T_A = 25°C, V_{DD} = 15V, C_{LOAD} = 1000pF, unless otherwise specified

PARAMETER	DESCRIPTION	TEST CONDITIONS	MIN	TYP	MAX	UNITS
INPUT/OUTPUT						
V_{IH}	Logic "1" Input Voltage		3.0	2.4		V
I_{IH}	Logic "1" Input Current			0.1	10.0	µA
V_{IL}	Logic "0" Input Voltage			1.8	0.8	V
I_{IL}	Logic "0" Input Current			0.1	10.0	µA
V_{HVS}	Input Hysteresis			0.5		V
V_{ENH}	Enable Threshold	Positive Edge	2.8	1.6		V
V_{ENL}	Disable Threshold	Negative Edge		0.9	0.6	V
$V_{EN\ HYS}$	Enable Hysteresis			0.7		V
$I_{DS\ OFF}$	Output Leakage	$GND \le V_{OUT} \le V_{DD}$	-10.0	0.2	10.0	µA
R_{OH}	Pull-up Resistance	I_{OUT} = -100mA		5.0	10.0	Ω
R_{OL}	Pull-down Resistance	I_{OUT} = +100mA		5.0	10.0	Ω
I_{PK}	Peak Output Current			1.0		A
I_{DC}	Continuous Output Current Source/Sink		50.0			mA
POWER SUPPLY						
I_{DD}	Supply Current into V_{DD}	R_{SET} = 5.1k		6.0	10.0	mA
I_{HI}	Supply Current into V_{HI}			2.0	4.0	mA
$I_{DD\ OFF}$	Supply Current into V_{DD}	V_{EN} = 0.6V			750.0	uA
V_{DD}	Operating Voltage		4.5		15.0	V

AC Electrical Specifications

T_A = 25°C, V_{DD} = 15V, C_{LOAD} = 1000pF, unless otherwise specified

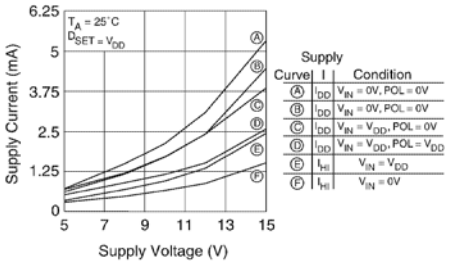
PARAMETER	DESCRIPTION	TEST CONDITIONS	MIN	TYP	MAX	UNITS
SWITCHING CHARACTERISTICS						
t_R	Rise Time	C_L = 500pF C_L = 1000pF		15.0 20.0	 40.0	ns
t_F	Fall Time	C_L = 500pF C_L = 1000pF		15.0 20.0	 40.0	ns
$t_{D\ ON\ HI}$	High Side Turn On Delay Time	$D_{SET} = V_{DD}$ R_{SET} = 5.1k R_{SET} = 400k	50.0 75.0 750.0	100.0 125.0 1150.0	150.0 200.0 1500.0	ns
$t_{D\ ON\ LO}$	Low Side Turn On Delay Time	$D_{SET} = V_{DD}$ R_{SET} = 5.1k R_{SET} = 400k	50.0 75.0 750.0	100.0 125.0 1150.0	150.0 200.0 1500.0	ns
$t_{D\ OFF\ HI}$	High Side Turn Off Delay Time	$D_{SET} = V_{DD}$		100.0	150.0	ns
$t_{D\ OFF\ LO}$	Low Side Turn Off Delay Time	$D_{SET} = V_{DD}$		100.0	150.0	ns
$t_{D\ MISMATCH}$	High to Lo Side Turn On Delay Mismatch	R_{SET} = 400k			±10.0	%

Pin Descriptions

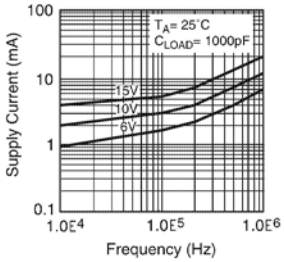
PIN #	NAME	FUNCTION
1	V_{HI}	Positive supply for the high side driver.
2	NC	
3	R^-	Internal connection between the low side and high side driver. This pin is normally unconnected.
4	P_{OL}	Controls the polarity of the low side driver.
5	IN_{HI}	Logic input for the high side driver.
6	IN_{LO}	Logic input for the low side driver.
7	D_{SET}	Connection for the delay adjust resistor.
8	EN	A high voltage on this pin enables the part.
9	GND	Negative supply of the low side driver and control circuitry.
10	N_{LO}	Low side driver output pull down.
11	P_{LO}	Low side driver output pull up.
12	V_{DD}	Positive supply of the low side driver and control circuitry.
13	R^+	Internal connection between the low side and high side driver. This pin is normally unconnected.
14	LX	Negative supply for the high side driver.
15	N_{HI}	High side driver output pull down.
16	P_{HI}	High side driver output pull up.

Typical Performance Curves

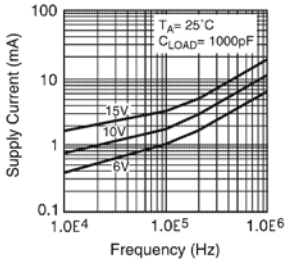
Quiescent Supply Current vs. Supply Voltage



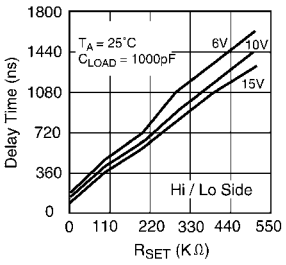
Avg. Supply Current into V_{DD} vs. Voltage and Frequency



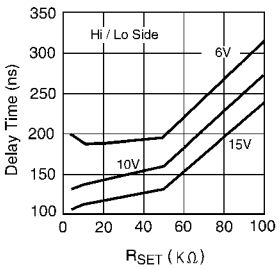
Average Supply Current into V_{HI} vs. Voltage and Frequency



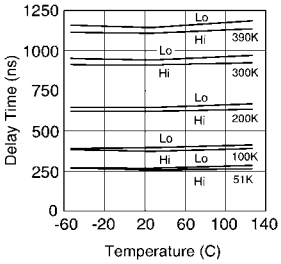
Output Rising Edge Delay vs. R_{SET} and Supply Voltage



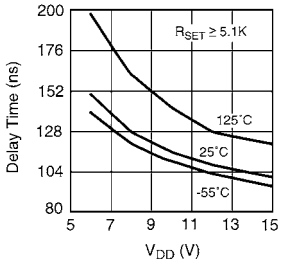
Output Rising Edge Delay vs. R_{SET} and Supply Voltage (Detail)



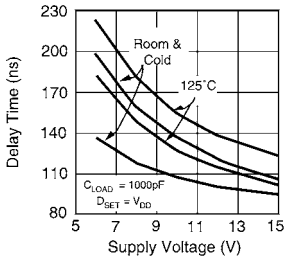
Output Rising Edge Delay vs. Temperature and R_{SET}



Output Falling Edge Delay vs. Supply Voltage and Temperature



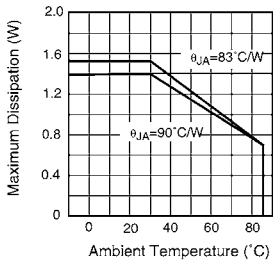
Delay Times* vs. Supply Voltage and Temperature



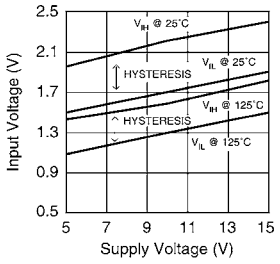
***Minimum Rising and Falling Edge Delay Time**

Typical Performance Curves

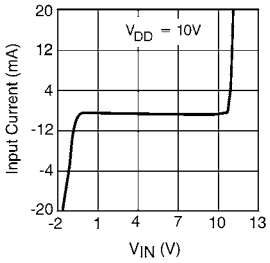
Max. Power/Derating Curves 16 Pin Package



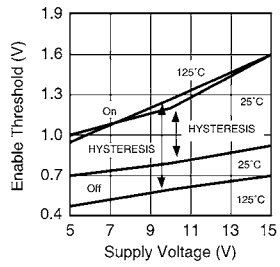
Input Threshold vs. Supply Voltage



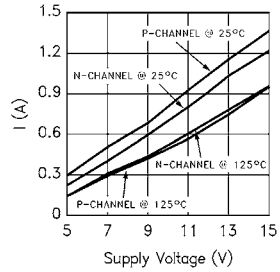
Input Current vs. Input Voltage



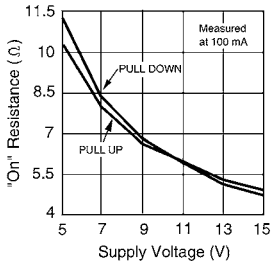
Enable Threshold vs. Supply Voltage



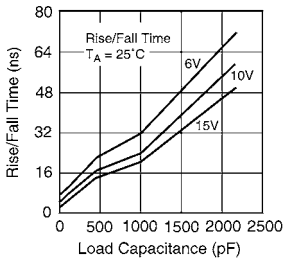
Peak Drive vs. Supply Voltage



"On" Resistance vs. Supply Voltage



Rise/Fall Time vs. Load and Supply



Rise/Fall Time vs. Temperature