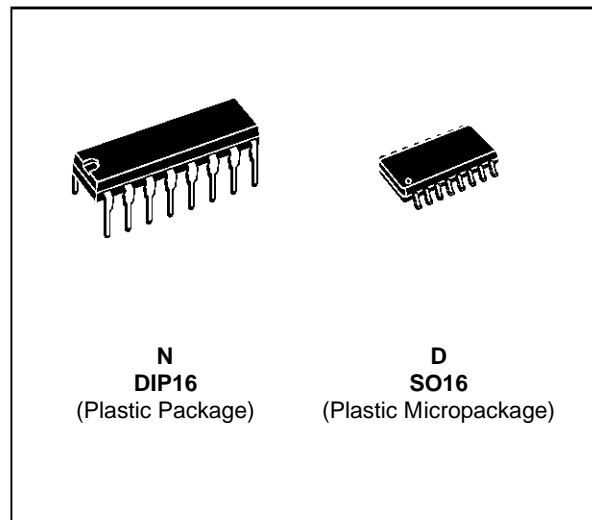


**TRIPLE IGBT/MOS DRIVER**

- THREE POWER IGBT/MOS AND PULSE TRANSFORMER DRIVERS
- CURRENT SENSE COMPARATOR WITH 1ms INHIBITION TIME FUNCTION
- INSTANTANEOUS SIGNAL TRANSMISSION
- 0.6 Amp PER CHANNEL PEAK OUTPUT CURRENT CAPABILITY
- LOW OUTPUT IMPEDANCE TYP : 7Ω at 200mA
- CMOS/LSTTL COMPATIBLE INVERTING INPUT WITH HYSTERESIS
- 4V TO 16V SINGLE SUPPLY OPERATION
- CURRENT AMPLIFIER
- LOW BIAS CURRENT TYP : 1.5mA
- ADJUSTABLE UNDERVOLTAGE LOCKOUT LEVEL
- STAND-BY MODE
- DURING POWER UP NO RANDOM OUTPUT STATE
- ENHANCED LATCH-UP IMMUNITY
- CHANNEL PARALLELING CAPABILITY


**ORDER CODES**

Part Number	Temperature Range	Package	
		N	D
TD310I	-40°C, +125°C	•	•

**DESCRIPTION**

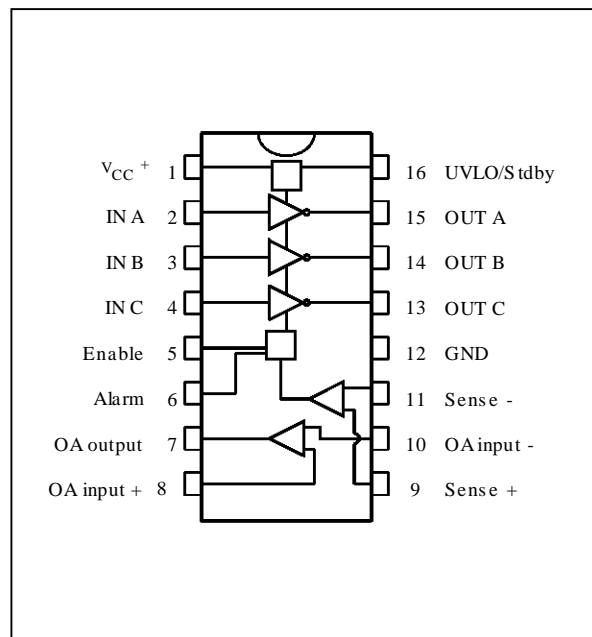
The TD310 is designed to drive one, two or three Power IGBT/MOS and has driving capability for pulse transformer. So it is perfectly suited to interface control IC with Power Switches in low side or half-bridge configuration.

The typical application shown figure 1 implements the TD310 in a pulse controlled half-bridge drive. Positive and negative pulses are applied to the pulse transformer to charge and discharge the IGBT/MOS gate capacitance. More sophisticated secondary circuits provide low impedance gate drive and short-circuit protection as shown in application note n° AN461.

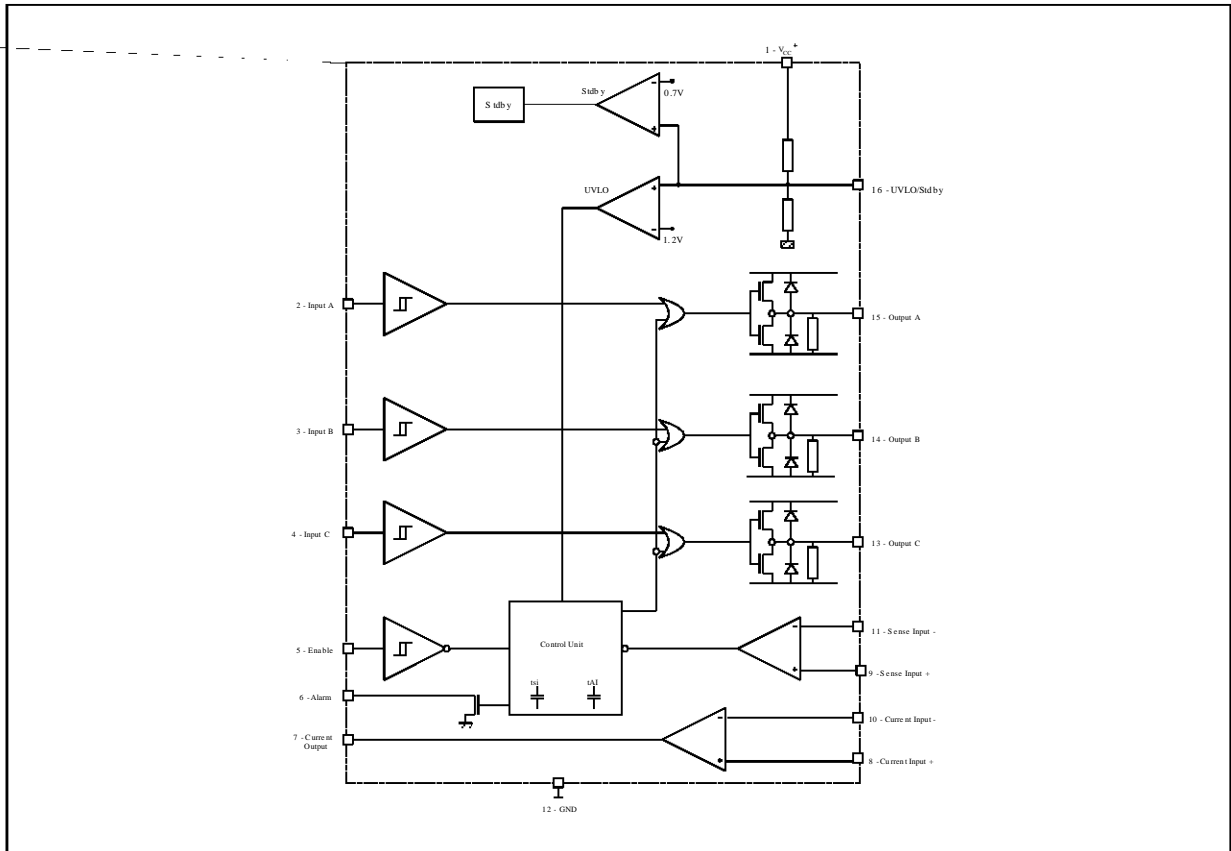
On Figure 2, TD310 is implemented as a low side driver in a typical 3 phase motor drive.

Figure 3 presents a general purpose low side gate drive.

In both case, the current amplifier provides interfacing between a sense resistor and an A/D converter.

**PIN CONNECTIONS**


**BLOCK DIAGRAM**



**ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	18	V
V <sub>i</sub>	Input Voltage	0 to V <sub>CC</sub>	V
V <sub>is</sub>	Sense Input Voltage	-0.3 to V <sub>CC</sub>	V
T <sub>j</sub>	Junction Temperature	-40 to 150	°C
T <sub>amb</sub>	Ambient Temperature	-40 to 125	°C

**OPERATING CONDITIONS**

Symbol	Parameter	Value	Unit
V <sub>CC</sub>	Supply Voltage	4 to 16	V

**INSTRUCTIONS FOR USE**

- 1 - The TD310 supply voltage must be decoupled with a 1μF min. capacitor.
- 2 - If the application involving TD310 requires maximum output current capability, this current must be pulsed : pulse width 1μsec, duty cycle 1% at T<sub>amb</sub>.

**ELECTRICAL CHARACTERISTICS**

$V_{CC} = 15V$ ,  $T_{amb} = 25^{\circ}C$  (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
$I_{CC}$	Supply Current with Inputs in High State		1.5	2	mA
<b>LOGIC INPUT (all inputs)</b>					
$V_{IH}$	High Input Voltage	2			V
$V_{IL}$	Low Input Voltage			0.8	V
$I_{IH}$	High Input Current		10		pA
$I_{IL}$	Low Input Current		10		pA
$t_{dH}, t_{eH}$ $t_{dL}, t_{eL}$	Propagation Delay (10% input to 10% output) Output Rise Output Fall $T_{min.} \leq T_{amb} \leq T_{max.}$		200 60	400 400	ns
$t_{ij}$	Input Inhibiting Time		100		ns
$t_{dd}$	Differential Delay Time Between Channels		20		ns
<b>OUTPUT DRIVERS</b>					
$V_{sod}$	Sourcing Drop Voltage (A/B/C outputs) $I_{source} = 200mA$			3	V
$V_{sid}$	Sinking Drop Voltage (A/B/C outputs) $I_{sink} = 200mA$			5	V
$V_{dem}$	Demagnetising Drop Voltage (A/B/C outputs) $I_{demag.} = 100mA$			2	V
$R_{opd}$	Output Pull Down Resistor		47		k $\Omega$
<b>ALARM OUTPUT</b>					
$I_s$	Low Level Sinking Current $V_o = 0.8V$	5	35		mA
$I_{sh}$	High Level Sinking Current			1	$\mu A$
$t_A$	Alarm Output : Delay Time to Alarm Fall if Sense Input Triggered			500	ns
<b>SENSE INPUT</b>					
$V_{ios}$	Input Offset Voltage			20	mV
$t_{Ai}$	Inhibition Time if Sense Input Triggered		1		ms
$t_s$	Delay Time to Output Fall if Sense Input Triggered All outputs inhibited			600	ns
$t_{si}$	Inhibition Time of Sense Input		300		ns
$V_{shys}$	Sense Hysteresis		40		mV
<b>OPERATIONAL AMPLIFIER</b>					
$V_{icm}$	Common Mode Input Voltage Range	0 to $V_{CC}^+ - 1.5$			V
$V_{io}$	Input Offset Voltage			10	mV
GBP	Gain Bandwidth Product		1		MHz
$A_{vd}$	Open Loop Gain	60			dB
SR	Slew Rate at Unity Gain $R_L = 100k\Omega$ , $C_L = 100pF$ , $V_i = 3$ to $7V$		0.6		V/ $\mu s$
<b>STAND-BY</b>					
$V_{stdby}$	Standby Mode Threshold Voltage	0.3		1.1	V
$I_{stdby}$	Standby Mode Supply Current		30		$\mu A$
<b>UNDER VOLTAGE LOCKOUT</b>					
$I_{adj}$	Under Voltage Level Adjust Current		1		$\mu A/V$
$V_{st1}$	Internal Stop Threshold (without external adjustment)	10.7		13.3	V
$V_{hys}$	Threshold Hysteresis		0.8		V

**UVLO/stdby pin functioning modes**

Due to the wide supply voltage range of the TD310, the UVLO function (Under Voltage Lock Out) is externally adjustable by a resistor bridge.

The bridge rate can be calculated in relation with the expected UVLO protection level as follows :

$$V_{UVLO} \times \frac{R1}{R1+R2} = 1.2V \text{ (where R1 is the lower resistor of the bridge)}$$

The internal resistor sets the default UVLO value to 12V (\*) and might influence the external bridge rate if the values of the external resistors are too high.

The standby threshold value depends of the UVLO value as follows :

$$V_{stdby} = 0.7/1.2 V_{UVLO}$$

Both UVLO and stdby functions can be inhibited by connecting the UVLO/stdby pin to  $V_{CC}^+$  via a pull up resistor (ex 150k $\Omega$ ).

The following table summarizes the functions of the TD310 :

	Pin	16	9/11	5	2/3/4	15/14 /13	6	7/8/10	
	Configuration	UVLO/stdby	Sense+/Sense-	Enable	In A/B/C	Out A/B/C	Alarm	Op. Amp.	Consumption
Normal	1	H	+ > -	X	X	L	L	OK	H (1.5mA)
			+ < -	H	IN	$\overline{IN}$	H		
Stdby	2	L	+ > -	X	X	L	L	HZ	L (30 $\mu$ A)
			+ < -				H		
UVLO	3	M	X	X	X	L	L	OK	H

**Configuration 1 : UVLO/stdby = H**

The TD310 is in a normal consumption state (1.5mA), the operational amplifier is normally functioning and the buffer outputs are determined by the sense comparator inputs, the enable inputs and the buffer inputs.

**Configuration 2 : UVLO/stdby = L**

The TD310 is in a low consumption state (standby mode 30 $\mu$ A), the buffer outputs are set to low state and the operational amplifier is in high impedance state.

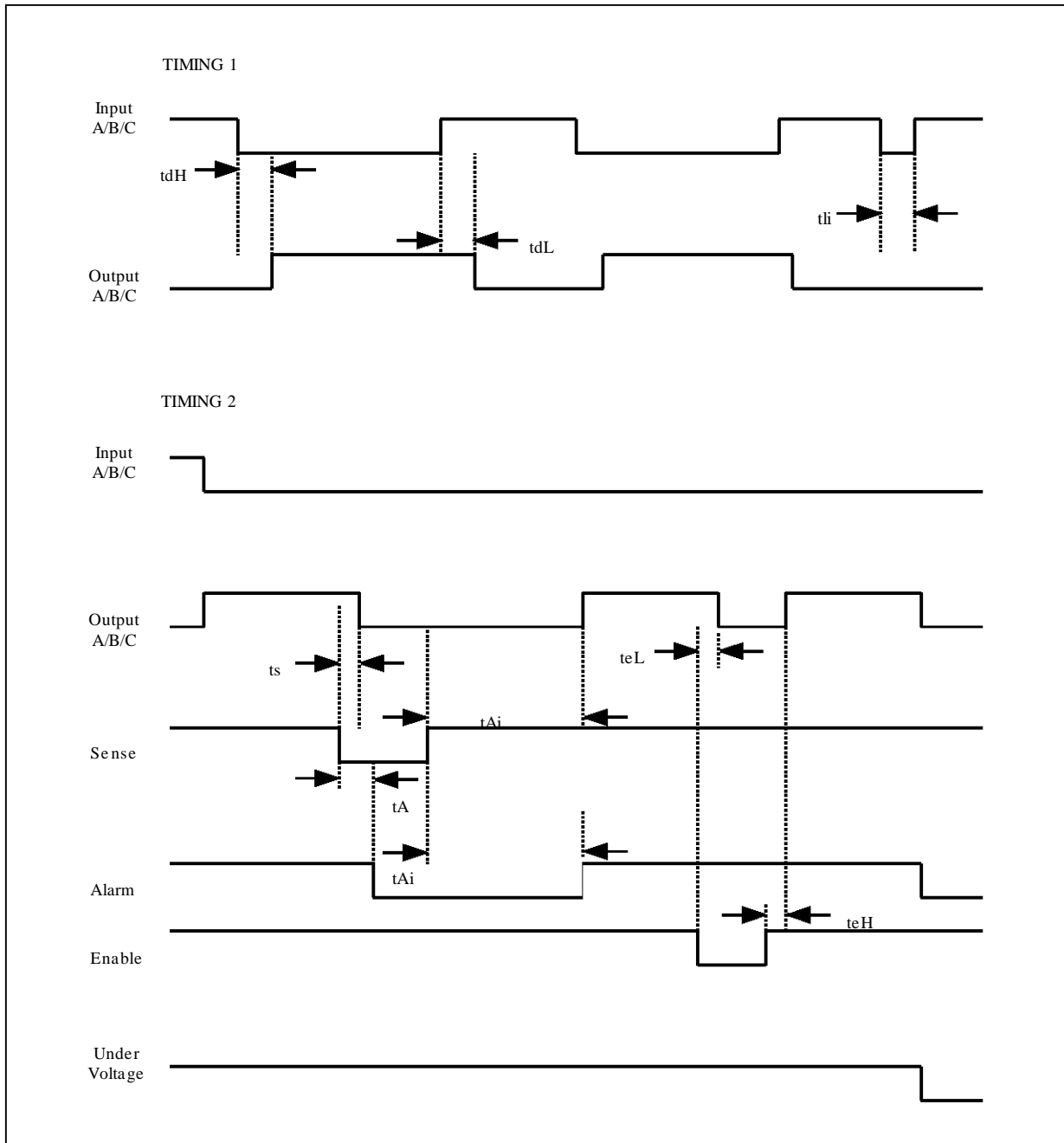
**Configuration 3 : UVLO/stdby = M**

The  $V_{CC}$  supply voltage is between  $V_{UVLO}$  and  $V_{stdby}$  (\*\*). The TD310 remains in a normal consumption state and the operational amplifier is normally functioning but the buffer outputs and the alarm pin are set to low state.

(\*) If the UVLO level remains unadjusted, it is recommended to bypass the UVLO/stdby pin with a 1nF capacitor.

(\*\*) If the supply voltage falls below  $V_{stdby}$ , the TD310 is set in standby mode (configuration 2).

TIMING DIAGRAM



TYPICAL APPLICATIONS

Figure 1 : THREE PHASE MOTOR DRIVE

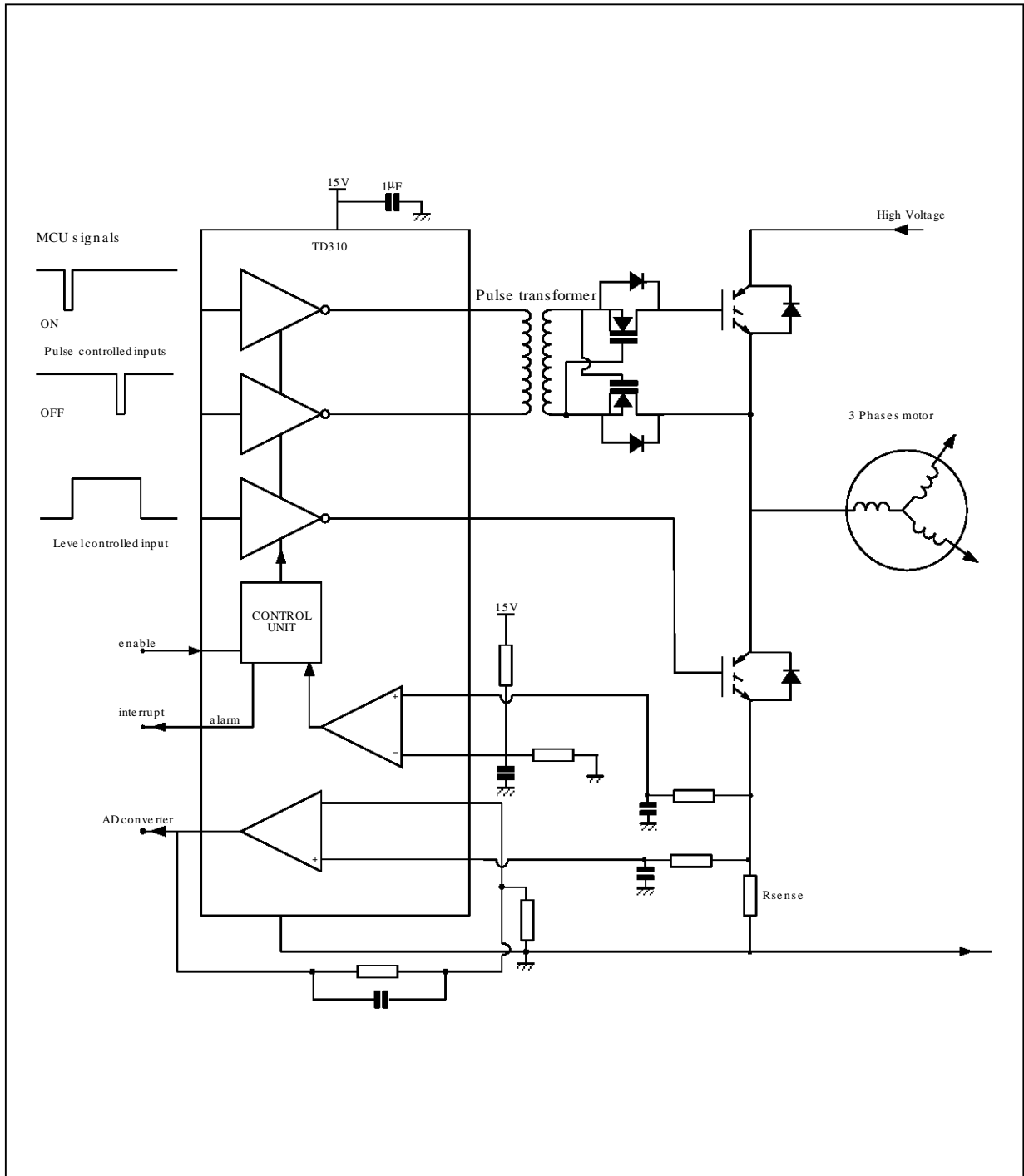


Figure 2 : THREE PHASE MOTOR LOW SIDE DRIVE

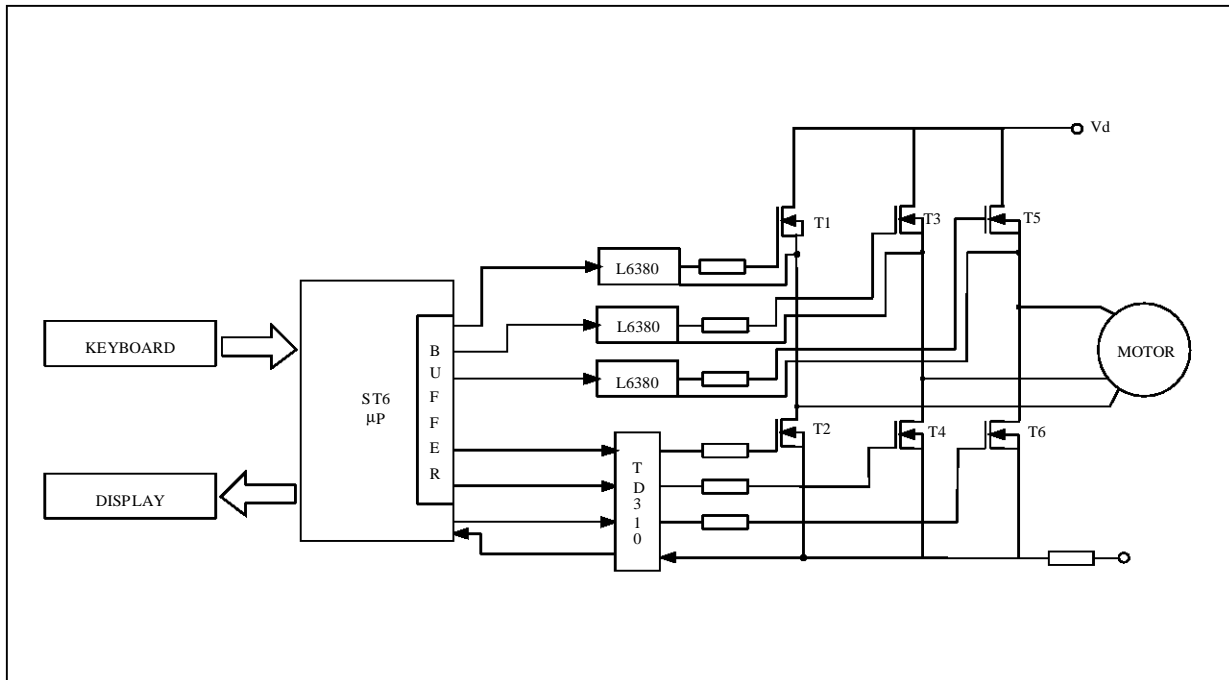
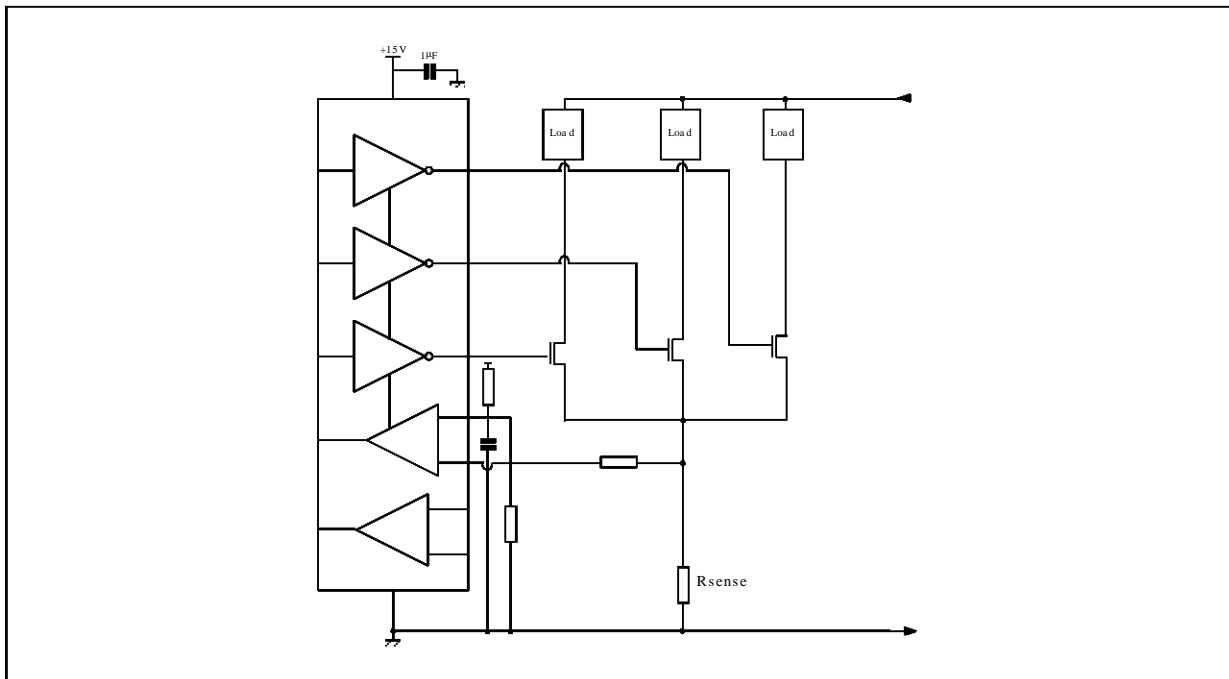
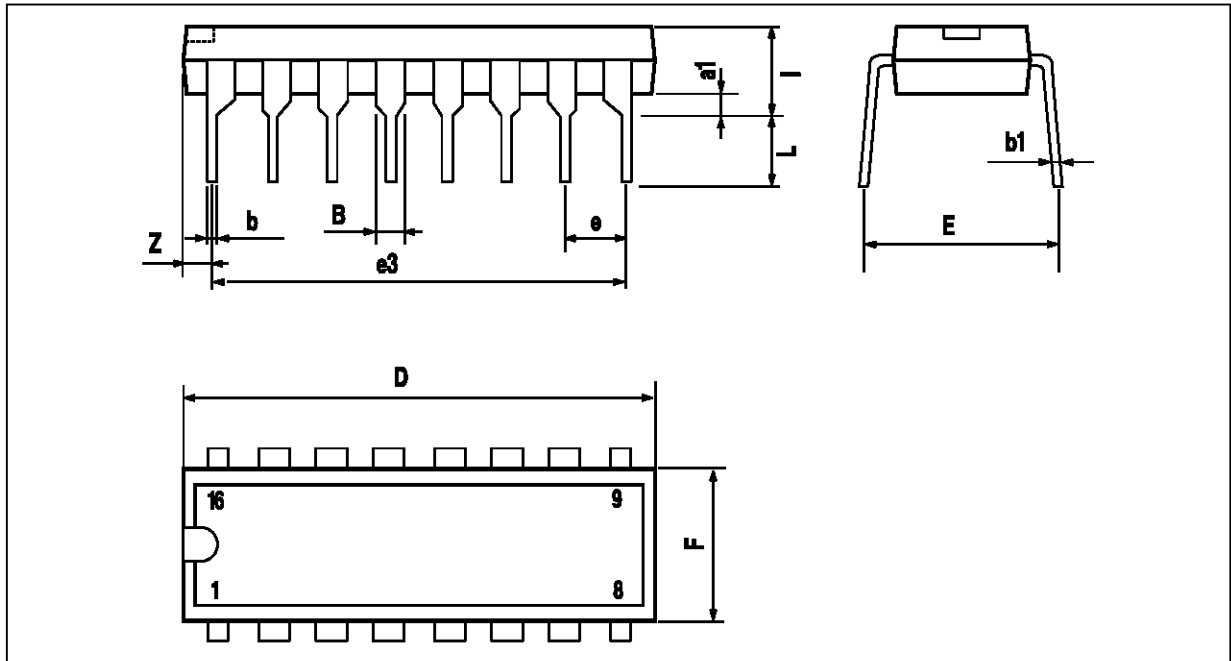


Figure 3 : LOW SIDE DRIVE



**PACKAGE MECHANICAL DATA**  
16 PINS - PLASTIC DIP



P/M-DIP16.EPS

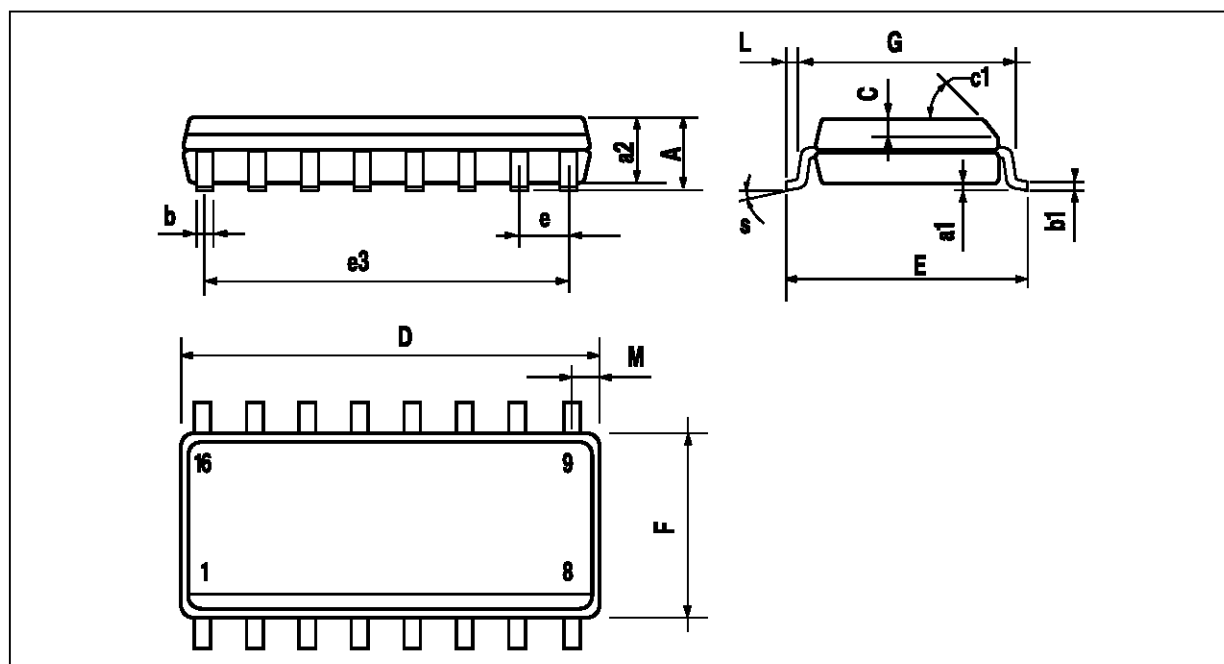
Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
a1	0.51			0.020		
B	0.77		1.65	0.030		0.065
b		0.5			0.020	
b1		0.25			0.010	
D			20			0.787
E		8.5			0.335	
e		2.54			0.100	
e3		17.78			0.700	
F			7.1			0.280
i			5.1			0.201
L		3.3			0.130	
Z			1.27			0.050

DIP16.TBL



## PACKAGE MECHANICAL DATA

16 PINS - PLASTIC MICROPACKAGE (SO)



PM-SO16.EPS

Dimensions	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A			1.75			0.069
a1	0.1		0.2	0.004		0.008
a2			1.6			0.063
b	0.35		0.46	0.014		0.018
b1	0.19		0.25	0.007		0.010
C		0.5			0.020	
c1	45° (typ.)					
D	9.8		10	0.386		0.394
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		8.89			0.350	
F	3.8		4.0	0.150		0.157
G	4.6		5.3	0.181		0.209
L	0.5		1.27	0.020		0.050
M			0.62			0.024

SO16.TBL

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