



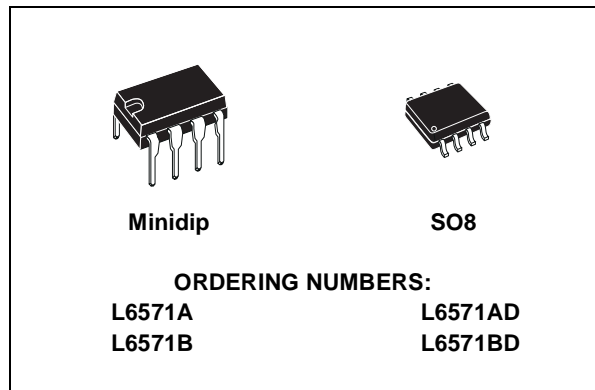
# L6571A L6571B

## HIGH VOLTAGE HALF BRIDGE DRIVER WITH OSCILLATOR

- HIGH VOLTAGE RAIL UP TO 600V
- BCD OFF LINE TECHNOLOGY
- 15.6V ZENER CLAMP ON  $V_S$
- DRIVER CURRENT CAPABILITY:
  - SINK CURRENT = 270mA
  - SOURCE CURRENT = 170mA
- VERY LOW START UP CURRENT: 150 $\mu$ A
- UNDER VOLTAGE LOCKOUT WITH HYSTERESIS
- PROGRAMMABLE OSCILLATOR FREQUENCY
- DEAD TIME 1.25 $\mu$ s (L6571A) or 0.72 $\mu$ s (L6571B)
- dV/dt IMMUNITY UP TO  $\pm 50$ V/ns
- ESD PROTECTION

### DESCRIPTION

The device is a high voltage half bridge driver with built in oscillator. The frequency of the oscillator can be programmed using external resistor and capaci-

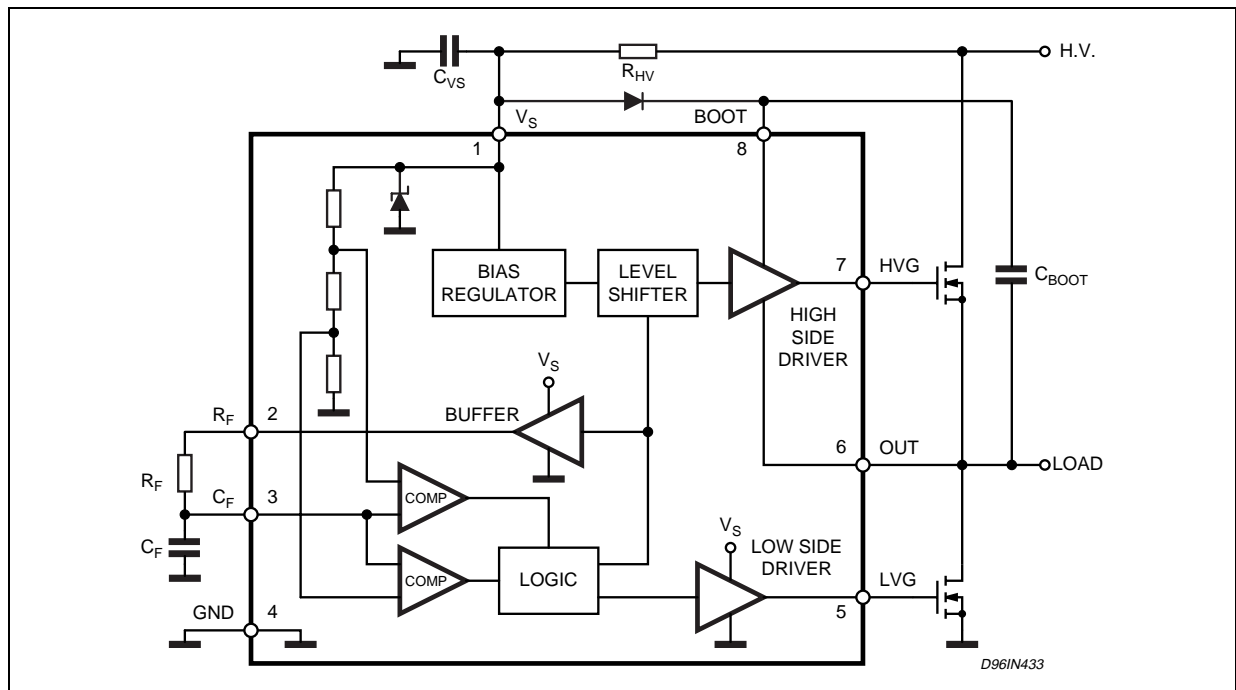


tor. The internal circuitry of the device allows it to be driven also by external logic signal.

The output drivers are designed to drive external n-channel power MOSFET and IGBT. The internal logic assures a dead time to avoid cross-conduction of the power devices.

Two version are available: L6571A and L6571B. They differ in the internal dead time: 1.25 $\mu$ s and 0.72 $\mu$ s (typ.)

### BLOCK DIAGRAM



## L6571A L6571B

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$I_S$ (*)	Supply Current	25	mA
$V_{CF}$	Oscillator Resistor Voltage	18	V
$V_{LVG}$	Low Side Switch Gate Output	14.6	V
$V_{OUT}$	High Side Switch Source Output	-1 to $V_{BOOT} - 18$	V
$V_{HVG}$	High Side Switch Gate Output	-1 to $V_{BOOT}$	V
$V_{BOOT}$	Floating Supply Voltage	618	V
$V_{BOOT/OUT}$	Floating Supply vs OUT Voltage	18	V
$dV_{BOOT}/dt$	$V_{BOOT}$ Slew Rate (Repetitive)	$\pm 50$	V/ns
$dV_{OUT}/dt$	$V_{OUT}$ Slew Rate (Repetitive)	$\pm 50$	V/ns
$T_{stg}$	Storage Temperature	-40 to 150	°C
$T_j$	Junction Temperature	-40 to 150	°C
$T_{amb}$	Ambient Temperature (Operative)	-40 to 125	°C

(\*)The device has an internal zener clamp between GND and VS (typical 15.6V). Therefore the circuit should not be driven by a DC low impedance power source.

**Note:** ESD immunity for pins 6, 7 and 8 is guaranteed up to 900 V (Human Body Model)

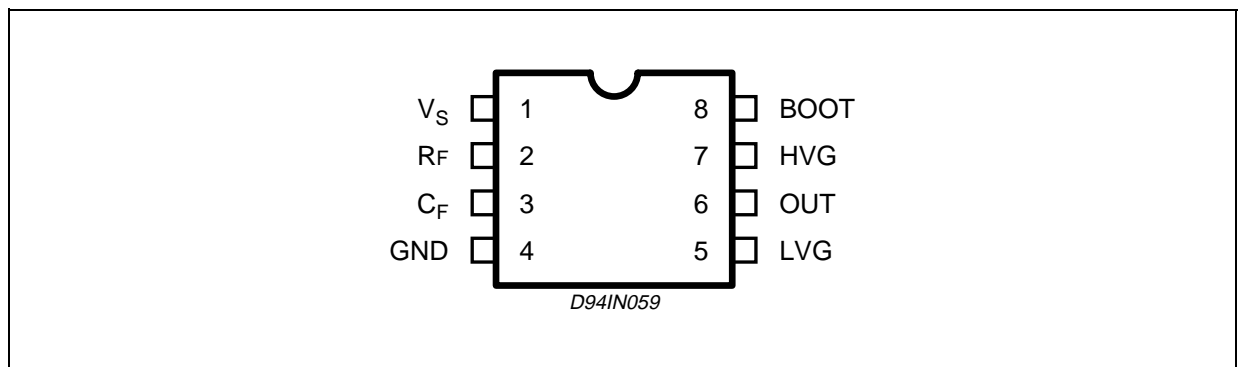
### THERMAL DATA

Symbol	Parameter	Minidip	SO8	Unit
$R_{th\ j-amb}$	Thermal Resistance Junction-Ambient Max	100	150	°C/W

### RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min.	Max.	Unit
$V_S$	Supply Voltage	10	$V_{CL}$	V
$V_{BOOT}$	Floating Supply Voltage	-	500	V
$V_{OUT}$	High Side Switch Source Output	-1	$V_{BOOT} - V_{CL}$	V
$f_{out}$	Oscillation Frequency		200	kHz

### PIN CONNECTION



## PIN FUNCTION

N°	Pin	Description
1	VS	Supply input voltage with internal clamp [typ. 15.6V]
2	RF	Oscillator timing resistor pin. A buffer set alternatively to $V_S$ and GND can provide current to the external resistor RF connected between pin 2 and 3. Alternatively, the signal on pin 2 can be used also to drive another IC (i.e. another L6569/71 to drive a full H-bridge)
3	CF	Oscillator timing capacitor pin. A capacitor connected between this pin and GND fixes (together with $R_F$ ) the oscillating frequency Alternatively an external logic signal can be applied to the pin to drive the IC.
4	GND	Ground
5	LVG	Low side driver output. The output stage can deliver 170mA source and 270mA sink [typ.values].
6	OUT	Upper driver floating reference
7	HVG	High side driver output. The output stage can deliver 170mA source and 270mA sink [typ.values].
8	BOOT	Bootstrap voltage supply. It is the upper driver floating supply.

ELECTRICAL CHARACTERISTICS ( $V_S = 12V$ ;  $V_{BOOT} - V_{OUT} = 12V$ ;  $T_j = 25^\circ C$ ; unless otherwise specified.)

Symbol	Pin	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{SUV P}$	1	VS Turn On Threshold		8.3	9	9.7	V
$V_{SUV N}$		VS Turn Off Threshold		7.3	8	8.7	V
$V_{SUV H}$		VS Hysteresis		0.7	1	1.3	V
$V_{CL}$		VS Clamping Voltage	$I_S = 5mA$	14.6	15.6	16.6	V
$I_{SU}$		Start Up Current	$V_S < V_{SUV N}$		150	250	$\mu A$
$I_q$		Quiescent Current	$V_S > V_{SUV P}$		500	700	$\mu A$
$I_{BOOTLK}$		8	Leakage Current BOOT pin vs GND	$V_{BOOT} = 580V$			5
$I_{OUTLK}$	6	Leakage Current OUT pin vs GND	$V_{OUT} = 562V$			5	$\mu A$
$I_{HVG SO}$	7	High Side Driver Source Current	$V_{HVG} = 6V$	110	175		mA
$I_{HVG SI}$		High Side Driver Sink Current	$V_{HVG} = 6V$	190	275		mA
$I_{LVG SO}$	5	Low Side Driver Source Current	$V_{LVG} = 6V$	110	175		mA
$I_{LVG SI}$		Low Side Driver Sink Current	$V_{LVG} = 6V$	190	275		mA
$V_{RFO N}$	2	RF High Level Output Voltage	$I_{RF} = 1mA$	$V_S - 0.05$		$V_S - 0.2$	V
$V_{RF OFF}$		RF Low Level Output Voltage	$I_{RF} = -1mA$	50		200	mV
$V_{CFU}$	3	CF Upper Threshold		7.7	8	8.2	V
$V_{CFL}$		CF Lower Threshold		3.80	4	4.3	V
$t_d$		Internal Dead Time	<b>L6571A</b> <b>L6571B</b>	0.85 0.50	1.25 0.72	1.65 0.94	$\mu s$ $\mu s$

**ELECTRICAL CHARACTERISTICS** (continued)

Symbol	Pin	Parameter	Test Condition	Min.	Typ.	Max.	Unit
DC		Duty Cycle, Ratio Between Dead Time + Conduction Time of High Side and Low Side Drivers		0.45	0.5	0.55	
I <sub>AVE</sub>	1	Average Current from Vs	No Load, fs = 60KHz		1.2	1.5	mA
f <sub>out</sub>	6	Oscillation Frequency	R <sub>T</sub> = 12K; C <sub>T</sub> = 1nF	57	60	63	kHz

**OSCILLATOR FREQUENCY**

The frequency of the internal oscillator can be programmed using external resistor and capacitor.

The nominal oscillator frequency can be calculated using the following equation:

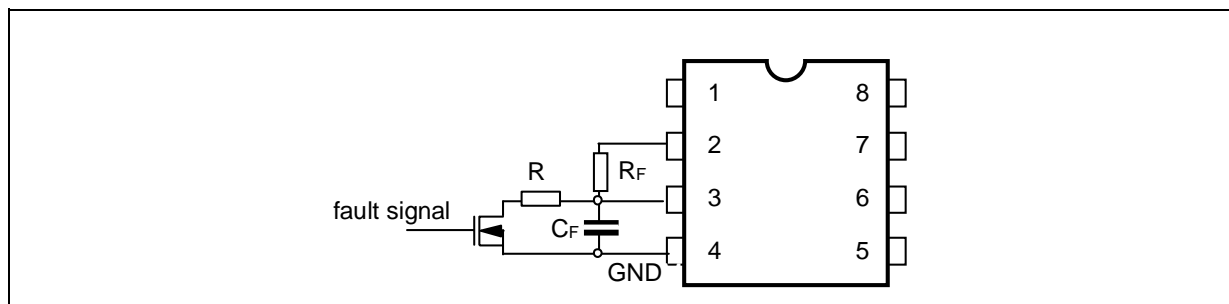
$$f_{osc} = \frac{1}{2 \cdot R_F \cdot C_F \cdot \ln 2} = \frac{1}{1.3863 \cdot R_F \cdot C_F}$$

Where R<sub>F</sub> and C<sub>F</sub> are the external resistor and capacitor.

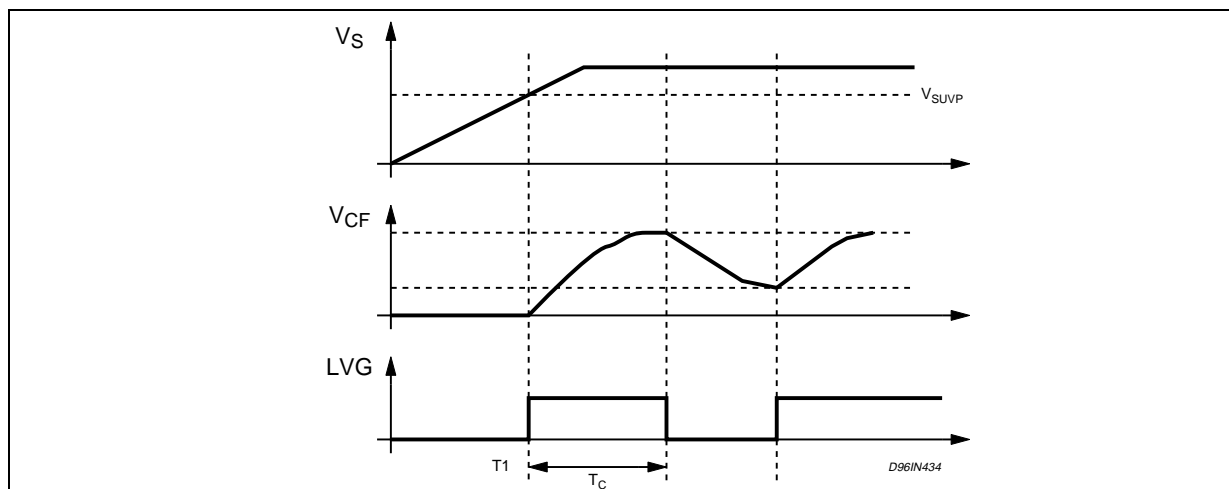
The device can be driven in "shut down" condition keeping the C<sub>F</sub> pin close to GND, but some caeres have to be taken:

1. When C<sub>F</sub> is to GND the high side driver is off and the low side is on
2. The forced discharge of the oscillator capacitor C<sub>F</sub> must not be shorter than 1us: a simple way to do this is to limit the current discharge with a resistive path imposing R · C<sub>F</sub> > 1μs (see fig.1)

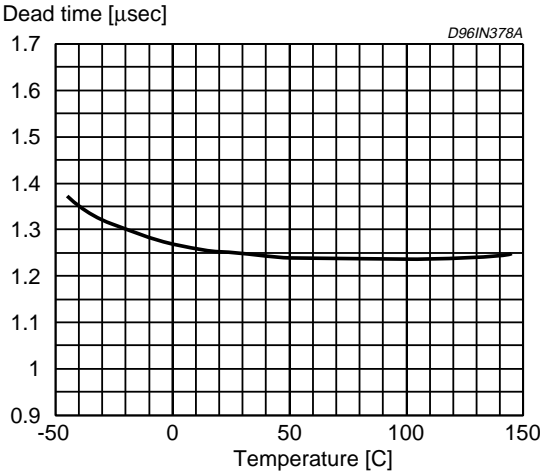
**Figure 1.**



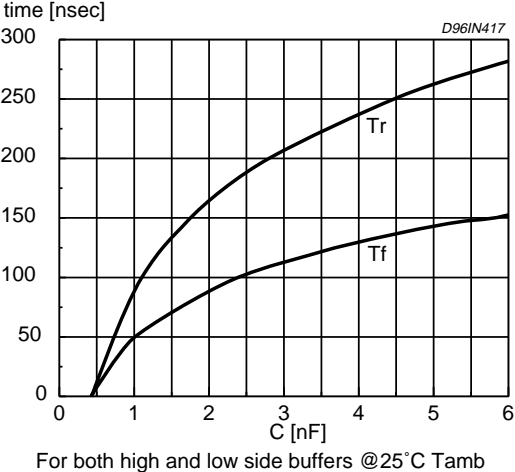
**Figure 2. Waveforms**



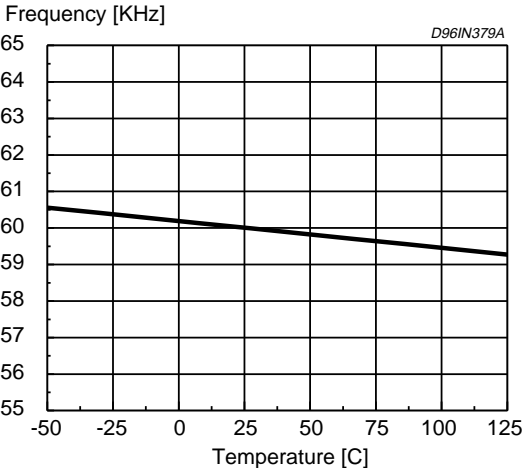
**Figure 3. Typical Dead Time vs. Temperature Dependency (L6571A)**



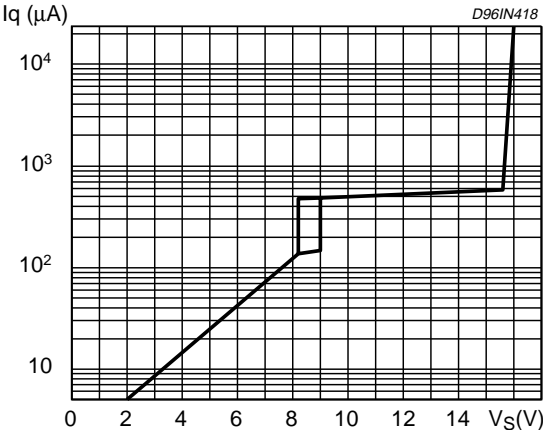
**Figure 6. Typical Rise and Fall Times vs. Load Capacitance**



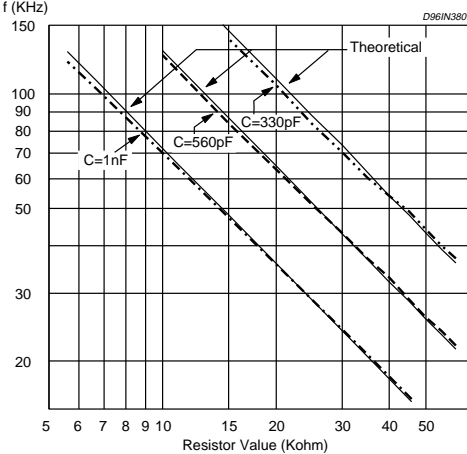
**Figure 4. Typical Frequency vs Temperature Dependency**



**Figure 7. Quiescent Current vs. Supply Voltage.**

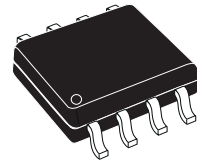


**Figure 5. Typical and Theoretical Oscillator Frequency vs Resistor Value**



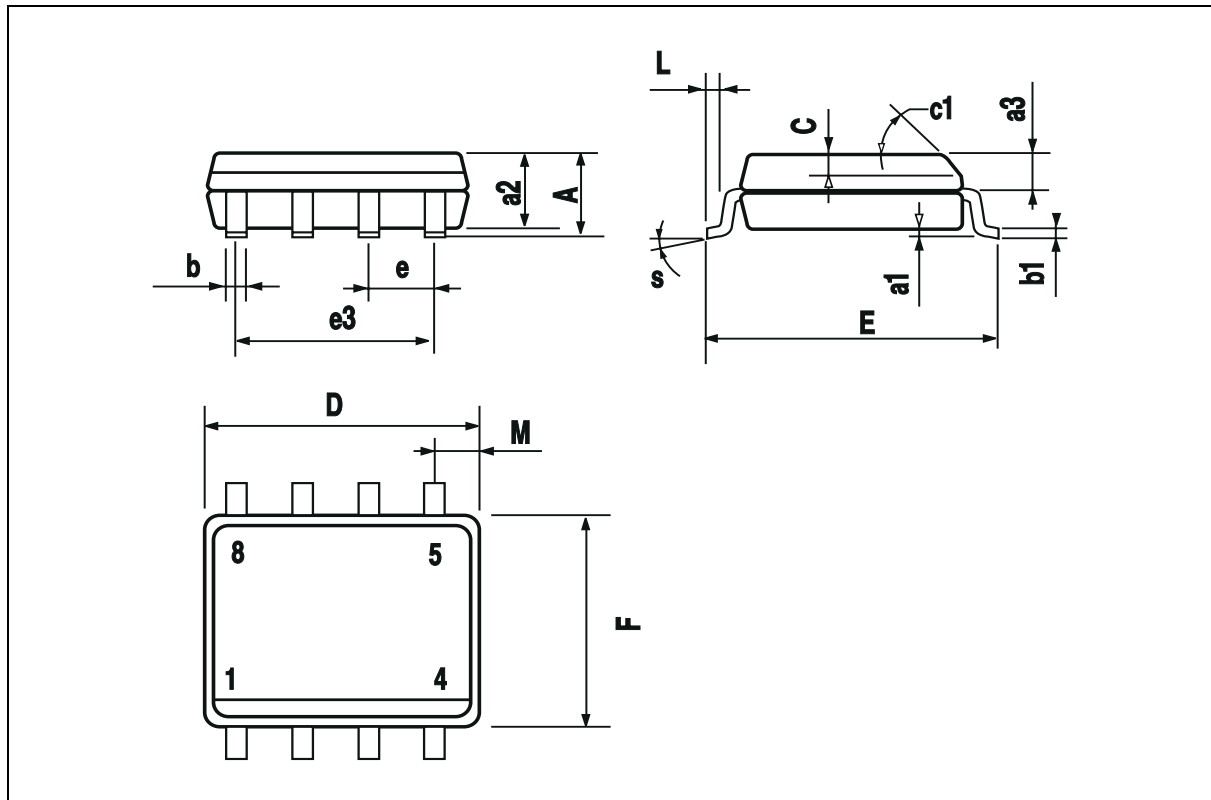
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			1.75			0.069
a1	0.1		0.25	0.004		0.010
a2			1.65			0.065
a3	0.65		0.85	0.026		0.033
b	0.35		0.48	0.014		0.019
b1	0.19		0.25	0.007		0.010
C	0.25		0.5	0.010		0.020
c1	45° (typ.)					
D (1)	4.8		5.0	0.189		0.197
E	5.8		6.2	0.228		0.244
e		1.27			0.050	
e3		3.81			0.150	
F (1)	3.8		4.0	0.15		0.157
L	0.4		1.27	0.016		0.050
M			0.6			0.024
S	8° (max.)					

**OUTLINE AND MECHANICAL DATA**



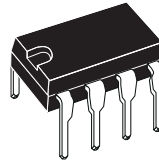
**SO8**

(1) D and F do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.15mm (.006inch).

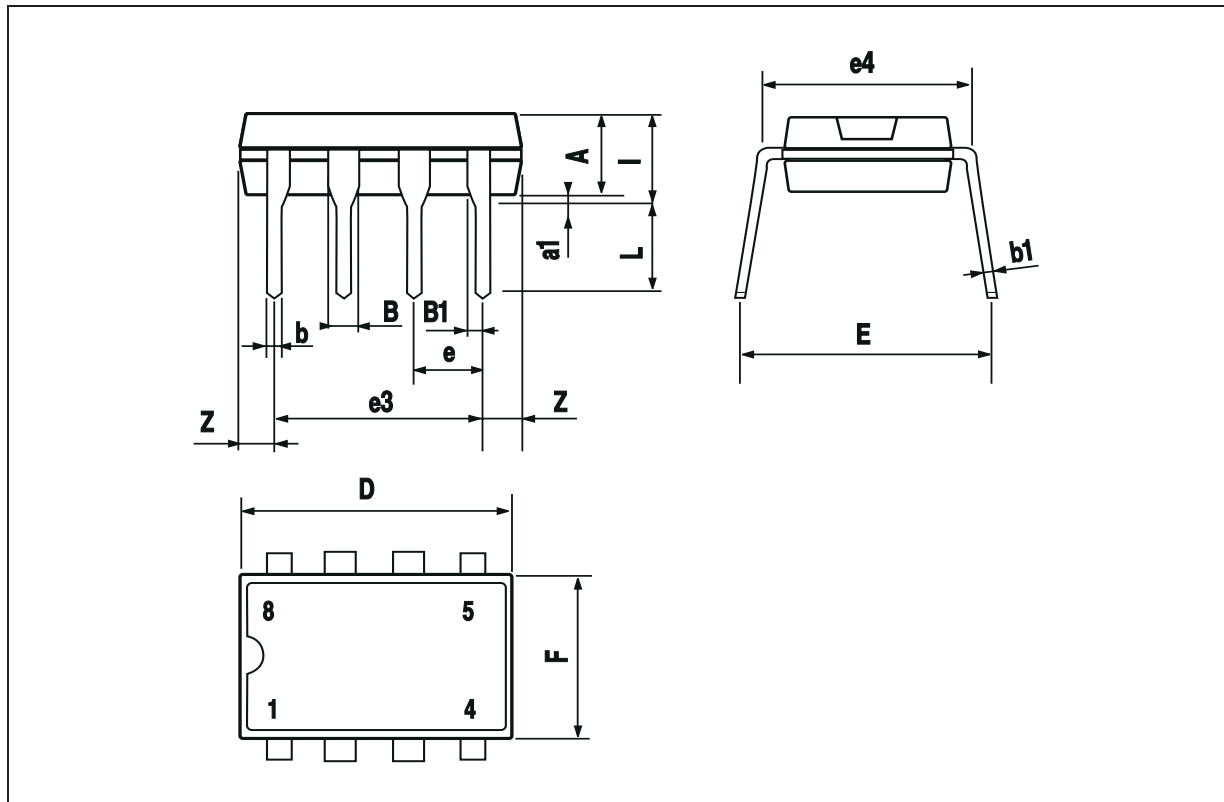


DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
I			5.08			0.200
L	3.18		3.81	0.125		0.150
Z			1.52			0.060

**OUTLINE AND MECHANICAL DATA**



**Minidip**



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