



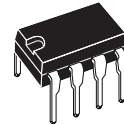
L6569 L6569A

HIGH VOLTAGE HALF BRIDGE DRIVER WITH OSCILLATOR

- HIGH VOLTAGE RAIL UP TO 600V
- BCD OFF LINE TECHNOLOGY
- INTERNAL BOOTSTRAP DIODE STRUCTURE
- 15.6V ZENER CLAMP ON V_S
- DRIVER CURRENT CAPABILITY:
 - SINK CURRENT = 270mA
 - SOURCE CURRENT = 170mA
- VERY LOW START UP CURRENT: 150µA
- UNDER VOLTAGE LOCKOUT WITH HYSTERESIS
- PROGRAMMABLE OSCILLATOR FREQUENCY
- DEAD TIME 1.25µs
- dV/dt IMMUNITY UP TO ±50V/ns
- ESD PROTECTION

DESCRIPTION

The device is a high voltage half bridge driver with built in oscillator. The frequency of the oscillator can



Minidip



SO8

ORDERING NUMBERS:

L6569
L6569A

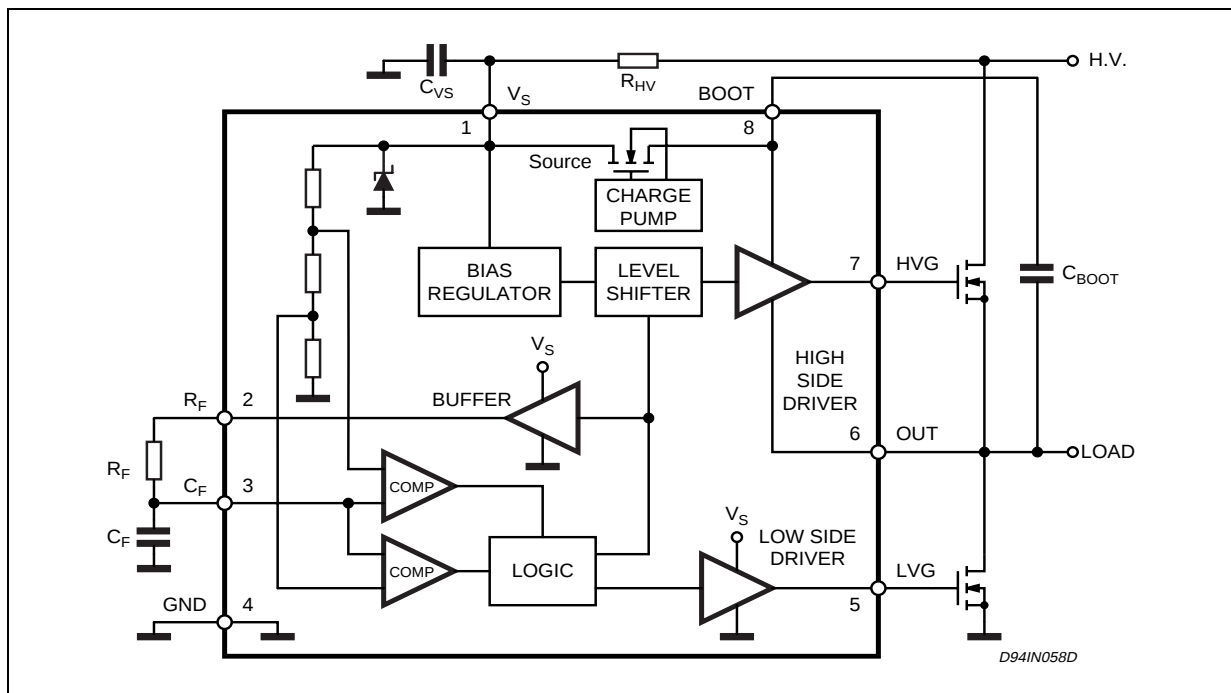
L6569D
L6569AD

be programmed using external resistor and capacitor. 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 [typ. 1.25µs] to avoid cross-conduction of the power devices.

Two version are available: L6569 and L6569A. They differ in the low voltage gate driver start up sequence.

BLOCK DIAGRAM



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	VBOOT Slew Rate (Repetitive)	± 50	V/ns
dV_{OUT}/dt	VOUT Slew Rate (Repetitive)	± 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.

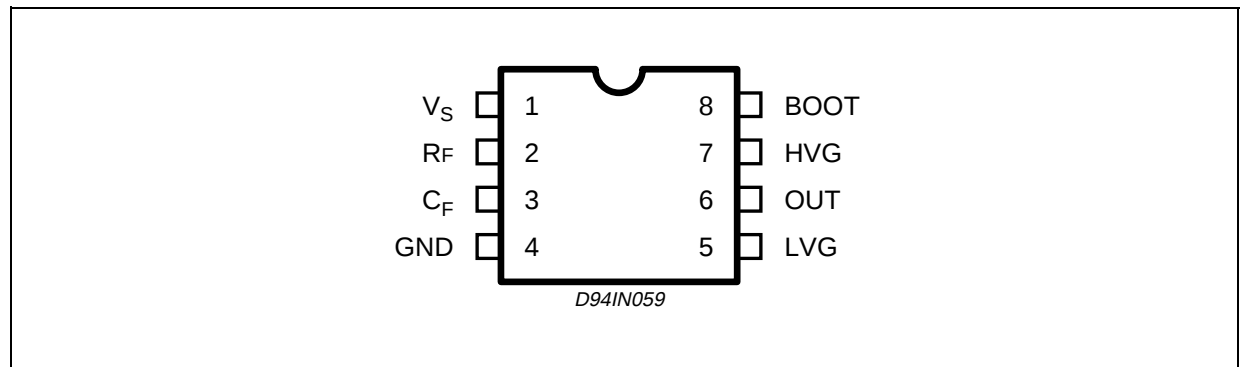
Note: ESD immunity for pins 6, 7 and 8 is guaranteed up to 900 V (Human Body Model)

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 R_F connected between pin 2 and 3. Alternatively, the signal on pin 2 can be used also to drive another IC (i.e. another L6569 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. The bootstrap capacitor connected between this pin and pin 6 can be fed by an internal structure named "bootstrap driver" (a patented structure). This structure can replace the external bootstrap diode.

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	μA
I_q		Quiescent Current	$V_S > V_{SUV P}$		500	700	μA
I_{BOOTLK}	8	Leakage Current BOOT pin vs GND	$V_{BOOT} = 580V$			5	μA
I_{OUTLK}	6	Leakage Current OUT pin vs GND	$V_{OUT} = 562V$			5	μA
$I_{HVG SO}$	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

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Pin	Parameter	Test Condition	Min.	Typ.	Max.	Unit
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		0.85	1.25	1.65	μs
DC		Duty Cycle, Ratio Between Dead Time + Conduction Time of High Side and Low Side Drivers		0.45	0.5	0.55	
R _{ON}		On resistance of Bootstrap LDMOS			120		Ω
V _{BC}		Bootstrap Voltage before UVLO	V _S = 8.2	2.5	3.6		V
I _{AVE}	1	Average Current from V _S	No Load, f _s = 60KHz		1.2	1.5	mA
f _{out}	6	Oscillation Frequency	R _T = 12K; C _T = 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_F and C_F are the external resistor and capacitor.

The device can be driven in "shut down" condition keeping the C_F pin close to GND, but some cares have to be taken:

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

Figure 1.

