L6590

FULLY INTEGRATED POWER SUPPLY **FIPS**™

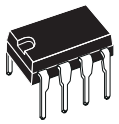
PRODUCT PREVIEW

Features

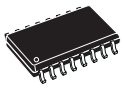
- WIDE-RANGE MAINS OPERATION
- "ON-CHIP" 700V BVDSS POWER MOS
- 100kHz INTERNAL OSCILLATOR
- 2.5V ±2% INTERNAL REFERENCE
- STANDBY MODE FOR HIGH EFFICIENCY AT LIGHT LOAD
- OVERCURRENT AND LATCHED OVERVOLTAGE PROTECTION
- NON DISSIPATIVE BUILT-IN START-UP CIRCUIT
- ON-CHIP SOFT START AND THERMAL SHUTDOWN

Main Applications

- WALL PLUG POWER SUPPLY UP TO 15W
- AC-DC ADAPTORS
- AUXILIARY POWER SUPPLY:
  - MONITORS (BLUE ANGEL)
  - DESKTOPS/SERVERS
  - FAX, TV, LASER PRINTERS
  - HOME APPLIANCES/LIGHTING
- LINE CARD, DC-DC CONVERTERS



Minidip



SO16W

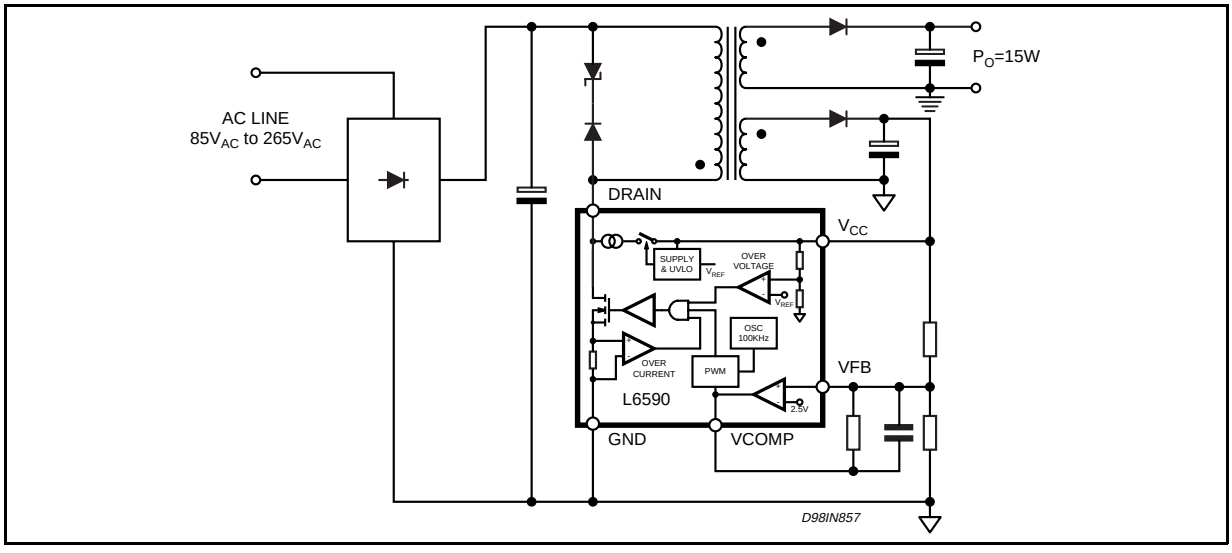
DESCRIPTION

The L6590 is a monolithic switching regulator designed in BCD OFF-LINE technology, able to operate with wide range input voltage and delivering an output power up to 15W. The internal switch. is implemented by a lateral high voltage power Mosfet with an Rdson of 15Ω and a BVDss of 700V. The internal fixed oscillator frequency, non dissipative start up and the internal soft start system allow to minimize the components count. A 2.5V+/-2% internal reference in addition to a high gain error amplifier make the device suitable for low cost applications with primary control.

Internal protections like cycle by cycle current limiting, output overvoltage protection and thermal shutdown generate a 'robust' design solution.

The device automatically reduces the frequency from 100KHz to 25KHz under light load conditions improving the efficiency.

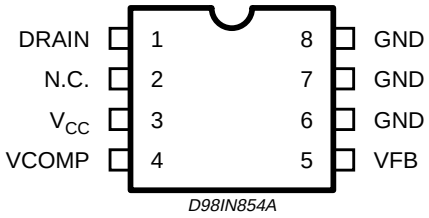
TYPICAL APPLICATION CIRCUIT



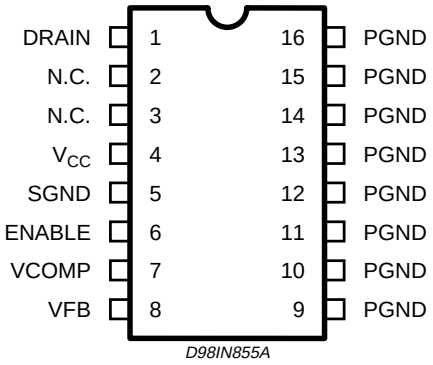
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{ds}	Drain Source Voltage	700	V
I_d	Drain Current	0.7	A
V_{cc}	Supply Voltage	18	V
	Error Amplifier Output Sink Current	3	mA
P_{tot}	Power Dissipation at T_{amb} < 50°C (Minidip)	1	W
T_j	Junction Temperature	150	°C
T_{stg}	Storage Temperature	-40 to 150	°C

PINS CONNECTION (Top views)



MINIDIP



SO16W

THERMAL DATA

Symbol	Parameter	Minidip	SO16W	Unit
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction to Ambient Free Air	60	-	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction to Ambient (*)	35 to 60	35 to 60	°C/W

(*) Value depending from PCB copper areas and thikness.

ELECTRICAL CHARACTERISTICS (T_j = 0 to 105°C, V_{cc} = 10V)

Power Section

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{dss}	Drain Source Voltage	I_d = 500µA	700			V
I_{dss}	Off State Drain Current	V_{ds} = 560V			500	µA
R_{dson}	Drain Source on state Resistance	I_d = 25mA		15	20	Ω
t_r	Rise Time			100		ns
t_f	Fall Time			100		ns

Error Amp Section

V_{fb}	Input Voltage	 Tj = 125°C	2.45 2.43	2.5 2.5	2.55 2.57	V V
I_b	Input Bias Current			-0.3	-1	µA
	Avol		60			dB
B	Unity Gain Bandwidth		0.7	1		MHz
SVR	Supply Voltage Rejection			70		dB
I_{osink}	Output Sink Current			1		mA
I_{source}	Output Source Current			500		µA
V_{oh}	V_{out} High	I_{source} = 0.5mA V_{fb} = 2V			4	V
V_{ol}	V_{out} Low	I_{sink} = 0.25mA V_{fb} = 3V	1			V

Oscillator Section

F_{osc}	Oscillator Frequency		90	100	110	KHz
F_{osc}/DT	Frequency Change with temperature			±5		%

PWM Section

Dmax	Max Duty Cycle			70		%
t_d	Propagation Delay			150		ns
t_m	Internal Masking Time		70	120	170	ns
I_{op}	Operating Supply Current			6	8	mA
I_{psc}	Peak Start up Current	V_{cc} = 0V	5	10	15	mA
V_z	Zener Voltage		17	17.5	18	V
V_{ddon}	Start Threshold Voltage		14	14.5	15	V
V_{ddoff}	Min Operating Voltage After Turn on		7	7.5	8	V

Soft Start

V_{ccss}	Soft Start Threshold Voltage		12	12.5	13	V

Circuit Protections

I_{lim}	Pulse by Pulse Current Limit		300	425	550	mA
OVP	Over Voltage Protection		15	15.5	16	V

Stand by Section

I_{pksb}	Current Threshold for Stand-By Operation	Transition from 100KHz to 25KHz		70		mA
F_{stb}	Stand by Frequency			25		KHz
I_{pknor}	Current Threshold for Normal Operation	Transition from 25KHz to 100KHz		170		mA
OVP	Over Voltage Protection		15	15.5	16	V

APPLICATION EXAMPLES

Figure 1. AC-DC Adaptor, Auxiliary P.S. (Isolated bias winding feedback)

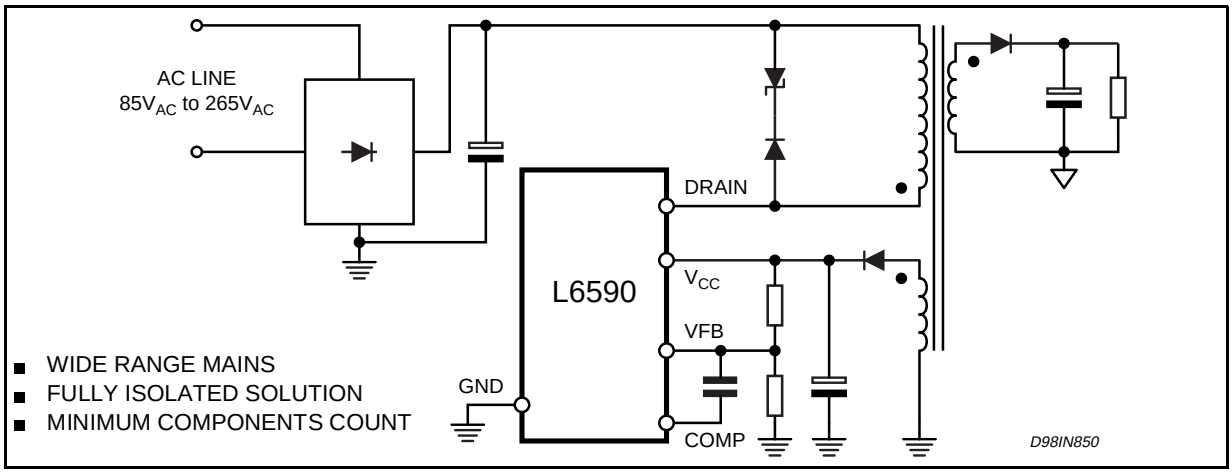


Figure 2. High Performance AC-DC Converter. (Secondary referenced optcoupler feedback)

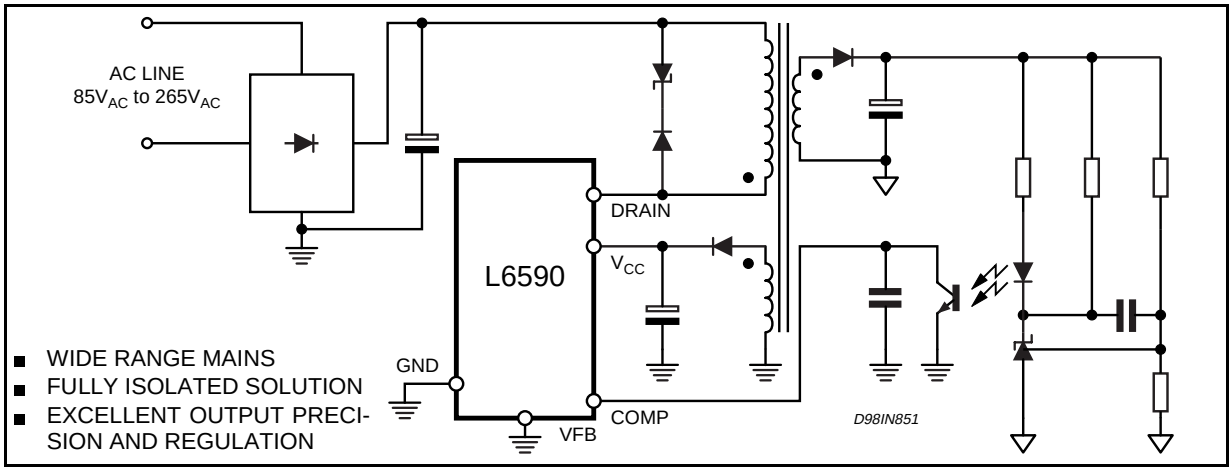
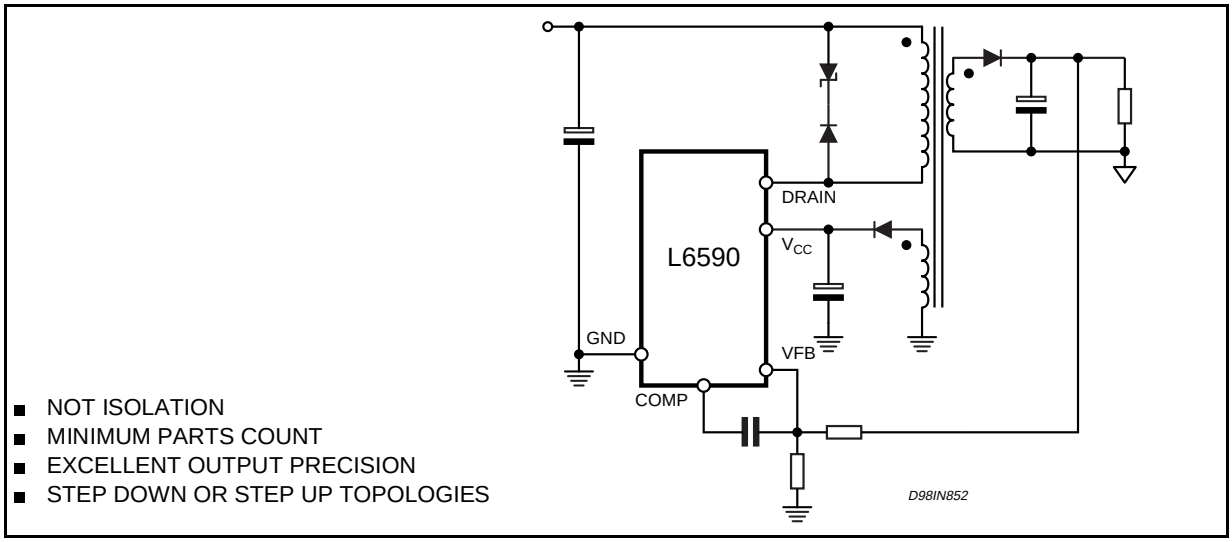
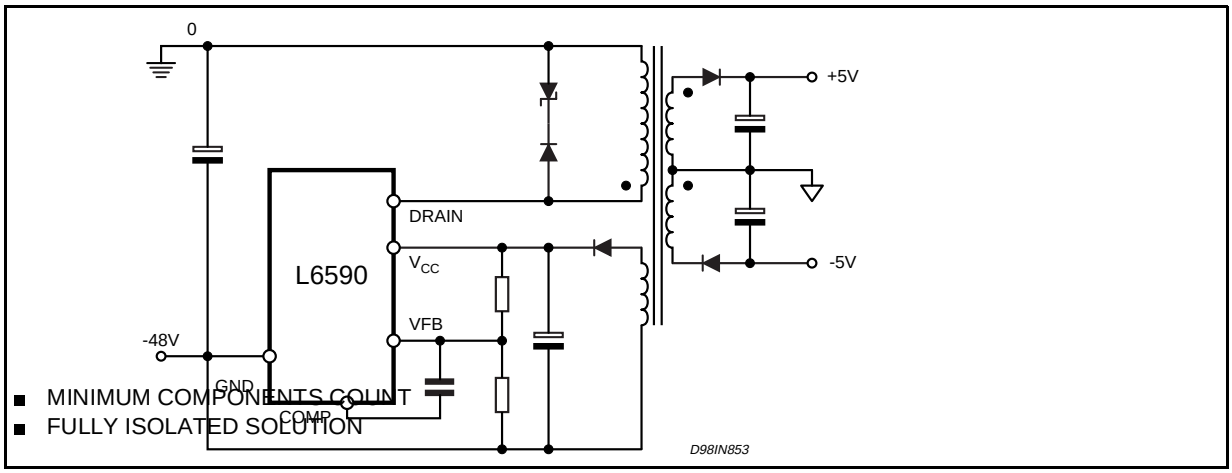


Figure 3. High Voltage DC-DC Converter.



APPLICATION EXAMPLE (continued)

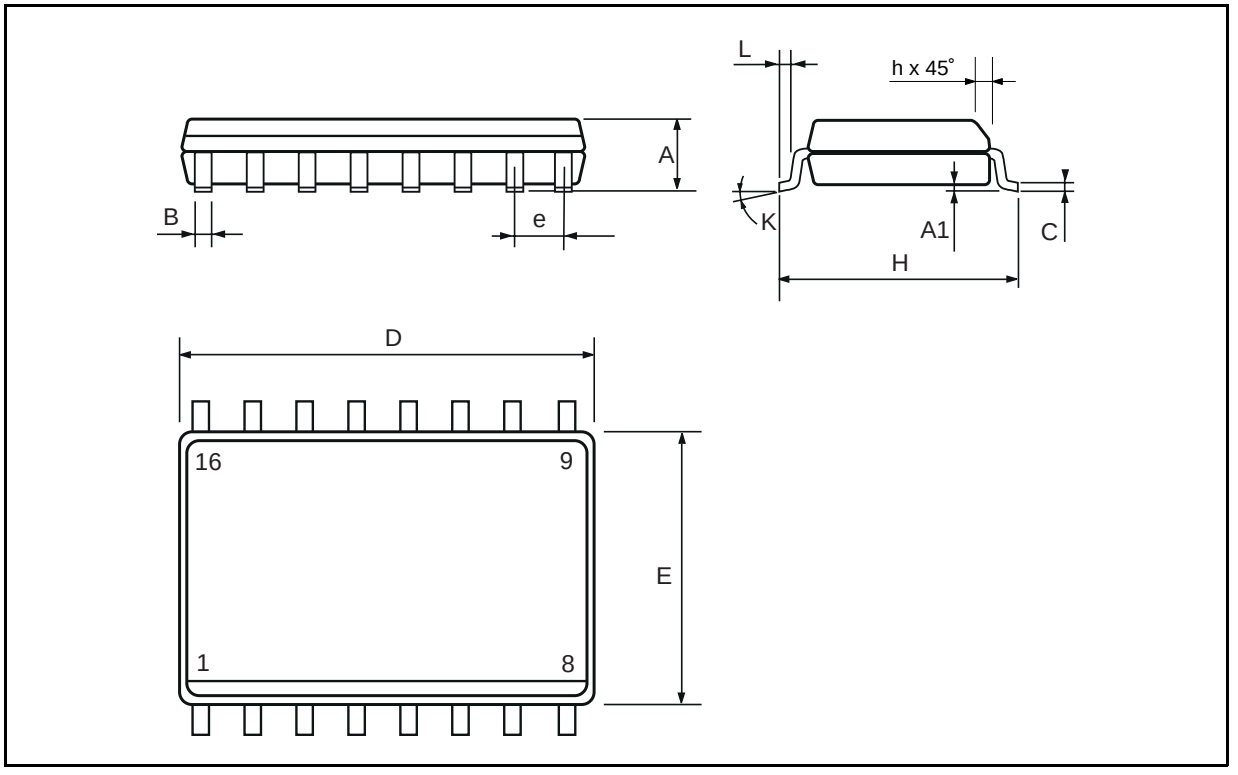
Figure 4. Line Card Application. (Isolated bias winding feedback)



- MINIMUM COMPONENTS COUNT
- FULLY ISOLATED SOLUTION

SO16 WIDE PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.35		2.65	0.093		0.104
A1	0.1		0.3	0.004		0.012
B	0.33		0.51	0.013		0.020
C	0.23		0.32	0.009		0.013
D	10.1		10.5	0.398		0.413
E	7.4		7.6	0.291		0.299
e		1.27			0.050	
H	10		10.65	0.394		0.419
h	0.25		0.75	0.010		0.030
L	0.4		1.27	0.016		0.050
K	0 (min.)8 (max.)					



MINIDIP PACKAGE MECHANICAL DATA

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