L6590

FULLY INTEGRATED POWER SUPPLY **FIPS**™

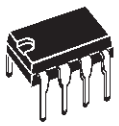
PRODUCT PREVIEW

Features

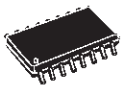
- WIDE-RANGE MAINS OPERATION
- "ON-CHIP" 700V BVDSS POWER MOS
- 65kHz INTERNAL OSCILLATOR
- 2.5V ±2% INTERNAL REFERENCE
- STANDBY MODE FOR HIGH EFFICIENCY AT LIGHT LOAD
- OVERCURRENT AND LATCHED OVERVOLTAGE PROTECTION
- NON DISSIPATIVE BUILT-IN START-UP CIRCUIT
- ON-CHIP SOFT START AND THERMAL SHUTDOWN

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

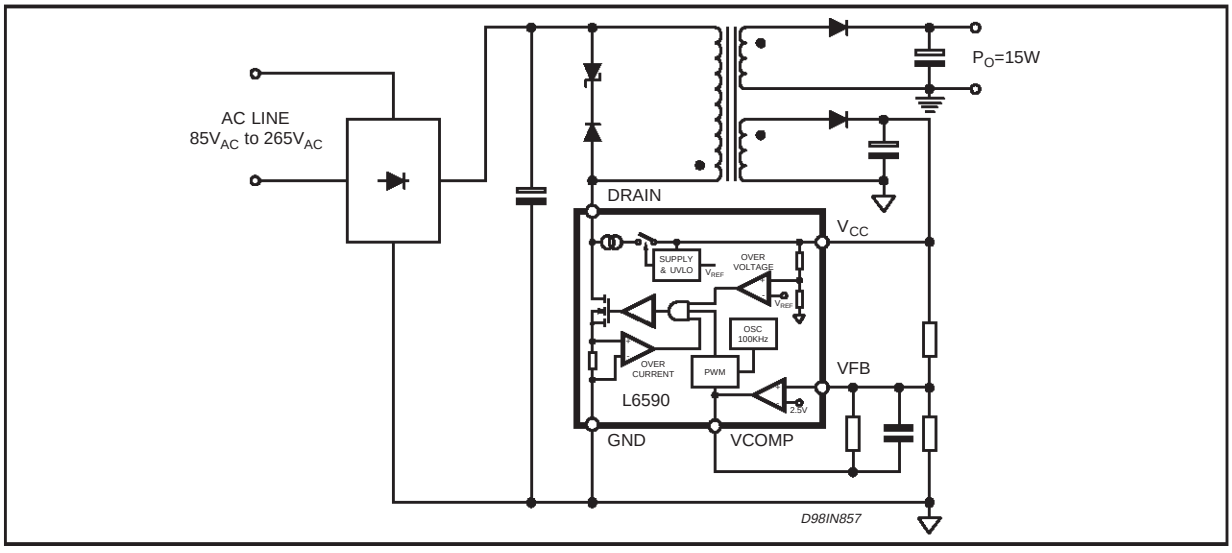
DESCRIPTION

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 13W. The internal switch. is implemented by a lateral high voltage power Mosfet with an Rdson of 13Ω 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 65KHz to 22KHz under light load conditions improving the efficiency.

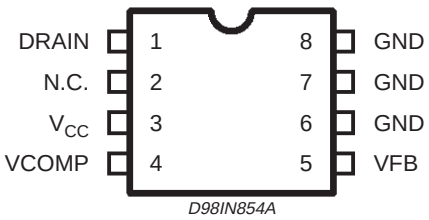
TYPICAL APPLICATION CIRCUIT



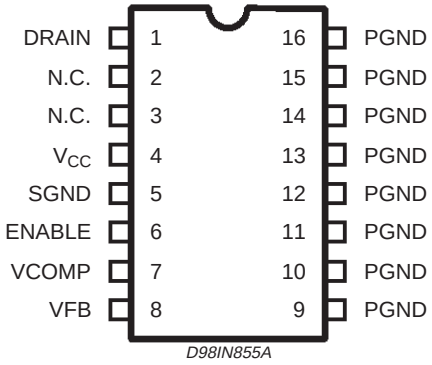
ABSOLUTE MAXIMUM RATINGS

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 Operating Temperature Range	-40 to 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; Tj = 25°C		13	17	Ω
		Tj = 125°C		26	35	Ω

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Error Amp Section						
V_{fb}	Input Voltage	Tj = 25°C	2.45	2.5	2.55	V
		Tj = 125°C	2.43	2.5	2.57	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_{source}	Output Source Current	Vcomp = 3.5V	0.5	1		mA
V_{oh}	V_{out} High	I_{source} = 0.5mA V_{fb} = 2V	3.8	4.5		V
V_{ol}	V_{out} Low	I_{sink} = 1mA V_{fb} = 3V			1.0	V
Oscillator Section						
F_{osc}	Oscillator Frequency	Tj = 25°C	58	65	72	KHz
			56	65	74	KHz
Dmin	Min. Duty Cycle	Vcomp = 1V			0	%
Dmax	Max. Duty Cycle		66	70	74	%
Device Operation Section						
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	dI/dt = 0.2A/µs	500	625	700	mA
OVP	Over Voltage Protection		15	15.5	16	V
t_m	Internal Masking Time			120		ns
Stand by Section						
I_{pksb}	Current Threshold for Stand-By Operation	Transition from 65KHz to 22KHz		70		mA
F_{stb}	Stand by Frequency	Tj = 25°C	19	23	27	KHz
I_{pknor}	Current Threshold for Normal Operation	Transition from 22KHz to 65KHz		170		mA
	Stand by current	f_{SW} = fstand-by		5	7.5	mA
PN/OFF/BROWN-OUT						
$V_{th\ on}$	Threshold Voltage (Device on)		2.425	2.5	2.575	V
I_{Hyst}	Source Current	V_{pin} = 3V	30	50	70	µA
I_{off}	Supply Current in Off Condition	V_{pin} = 2V		0.5		mA
I_p	Source Current	V_{pin} = 2V		5		mA
V_{CL}	On/Off Clamp Pull-Up Voltage	I_{sink} = 0.5mA	5	5.5	6	V
THERMAL SHUTDOWN (*)						
	Thermal Shutdown		150	165		°C
	Hysteresis			40		°C

(*) Parameter not tested in production.

APPLICATION EXAMPLES

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

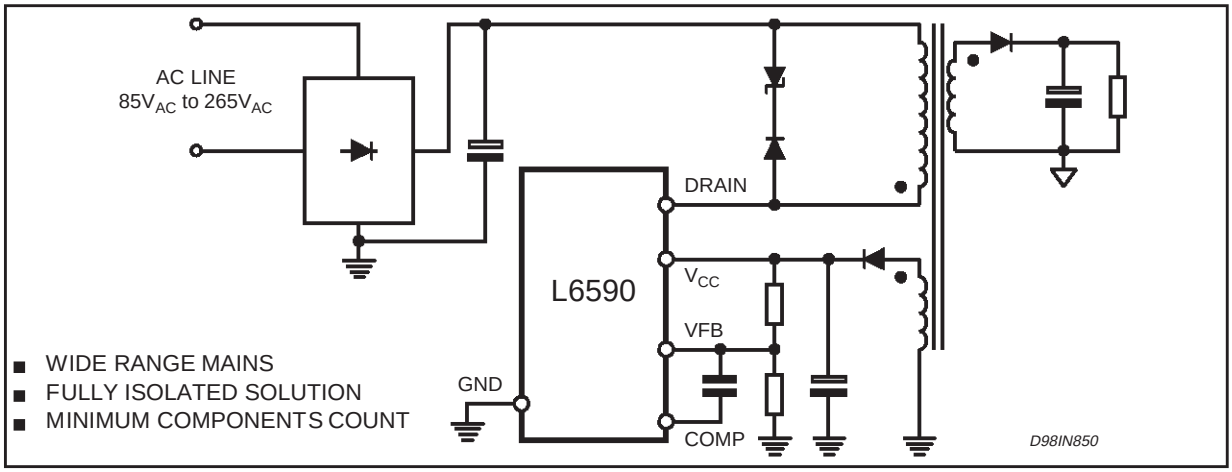


Figure 2. High Performance AC-DC Converter. (Secondary referenced optcoupler feedback)

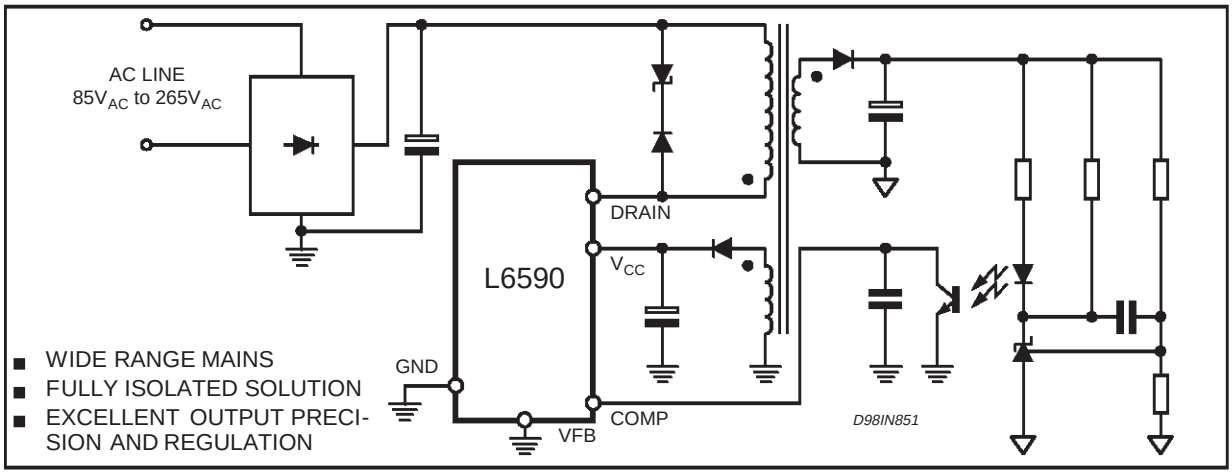
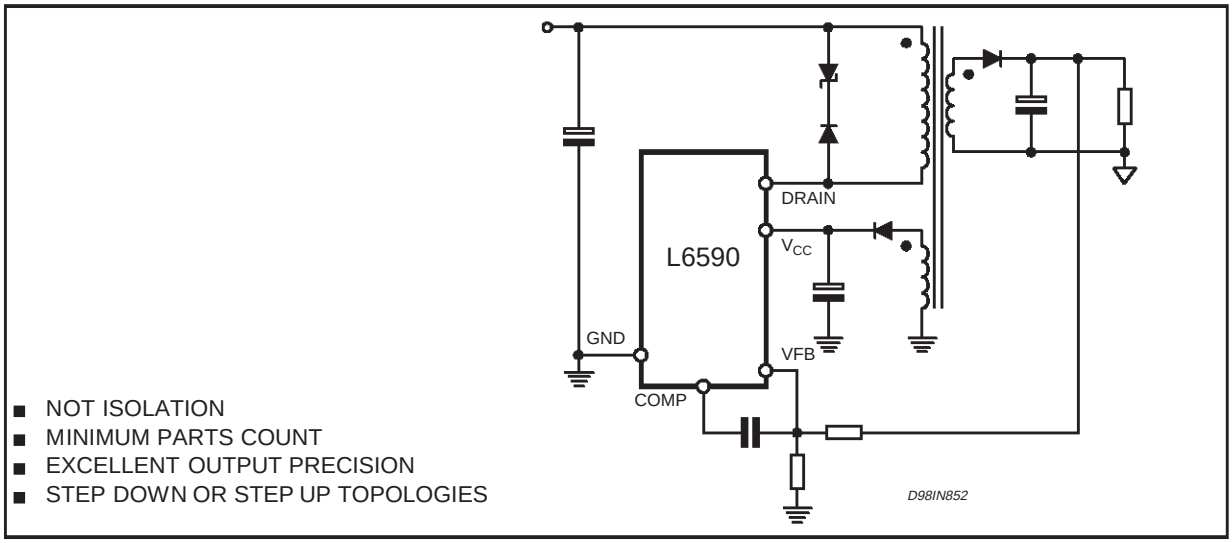
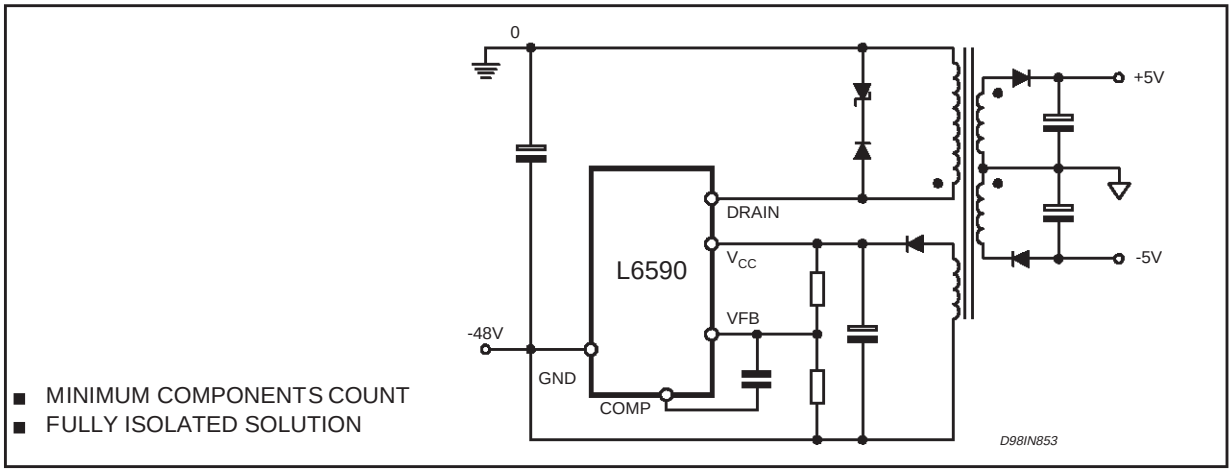


Figure 3. High Voltage DC-DC Converter.



APPLICATION EXAMPLE (continued)

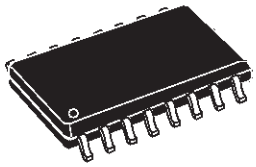
Figure 4. Line Card Application. (Isolated bias winding feedback)



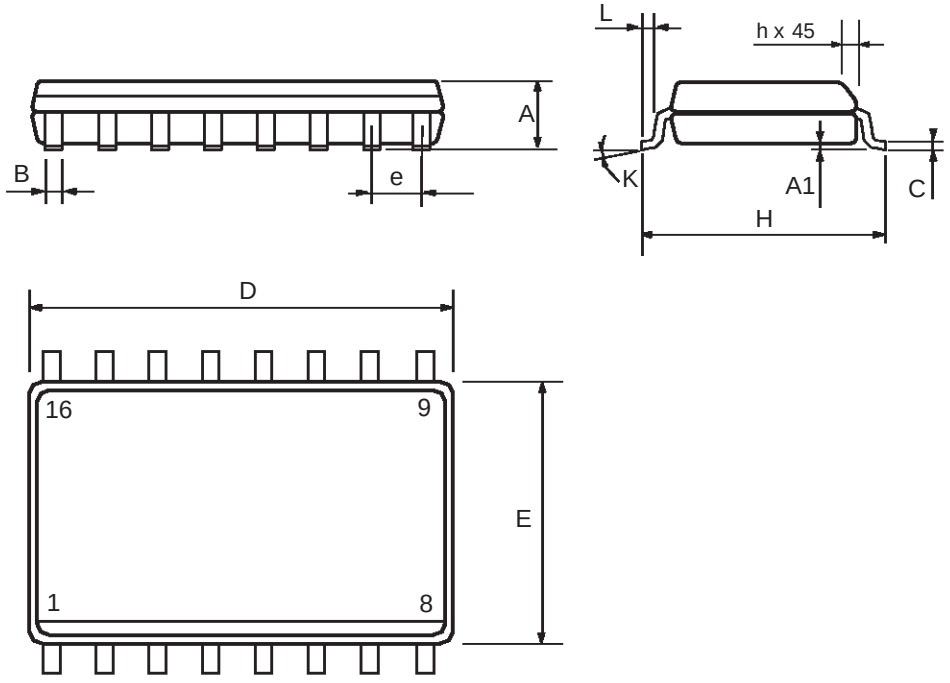
- MINIMUM COMPONENTS COUNT
- FULLY ISOLATED SOLUTION

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.)					

OUTLINE AND MECHANICAL DATA

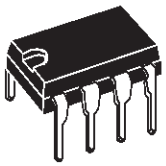


SO16 Wide



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



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