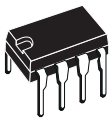
ST730A

5V STEP-DOWN, CURRENT-MODE PWM DC-DC CONVERTERS

- UP TO 450mA LOAD CURRENTS
- 200kHz HIGH-FREQUENCY CURRENT-MODE PWM
- 85% TO 96% EFFICIENCIES
- 33µH OR 100µH PRE-SELECTED INDUCTOR VALUE, NO COMPONENT DESIGN REQUIRED
- 0.8mA QUIESCENT CURRENT
- 0.3µA SHUTDOWN SUPPLY CURRENT
- ADJUSTABLE OUTPUT VOLTAGE
- OVERCURRENT, SOFT-START AND UNDERVOLTAGE LOCKOUT PROTECTION
- CYCLE-BY-CYCLE CURRENT LIMITING
- PACKAGE AVAILABLE: DIP-8 AND SO-8



DIP-8

SO-8

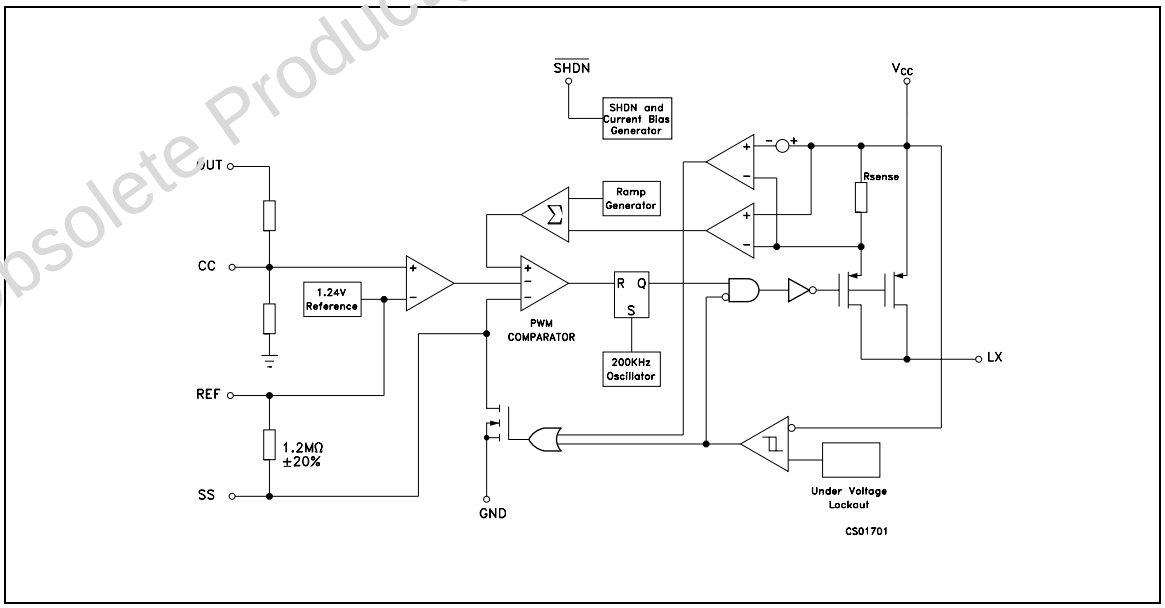
DESCRIPTION

The ST730A is a 5V output CMOS, step-down switching regulator. The ST730A accepts inputs between 5.2V and 11V and delivers 450mA. Typical efficiencies are 85% to 96%.

Quiescent supply current is 0.8mA and only 0.3µA in shutdown mode. The output does not exhibit frequency over this specified range. Pulse-width modulation (PWM) current-mode control provides precise output regulation and excellent transient responses. Output voltage accuracy is guaranteed to be ±5% over line, load, and temperature varations.

Fixed-frequency switching and absence of subharmonic ruipple allows easy filtering of output ripple and noise, as well as the use of small external components. This regulators require only a single inductor value to work in most applications, so no inductor design is necessary. Typical applications are: Cellular phones & radios, portable Instruments, Portable Communications Equipments and Computer Peripherals.

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter[2]	Value	Unit
V_{CC}	DC Input Voltage	-0.3 to 12	V
V_{LX}	Switch Pin Voltage	-0.3 to (V_{CC} + 0.3)	V
V_{SHDN}	Shutdown Voltage (SHDN)	-0.3 to (V_{CC} + 0.3)	V
V_S,V_C	Soft Start (SS) and Compensation Capacitor (CC) Pins Voltage	-0.3 to (V_{CC} + 0.3)	V
I_{LX}	Switching Peak Current	2	A
I_{REF}	Reference Current	2.5	mA
P_{TOT}	Continuous Power Dissipation at T_A=70°C (DIP-8) (SO-8)	550 344	mW mW
T_{stg}	Storage Temperature Range	-40 to +150	°C
T_{op}	Operating Junction Temperature Range (C series) (B series)	0 to +70 -40 to +85	°C °C

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

THERMAL DATA

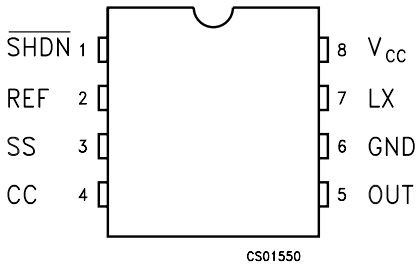
Symbol	Parameter	SO-8	DIP-8	Unit
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient (*)	160	100	°C/W

(*) This value depends from thermal design of PCB on which the device is mounted.

ORDERING CODES

TYPE	DIP8	SO-8	SO-8 (T&R)
ST730AB	ST730ABN	ST730ABD	ST730ABD-TR
ST730AC	ST730ACN	ST730ACD	ST730ACD-TR

CONNECTION DIAGRAM (top view)



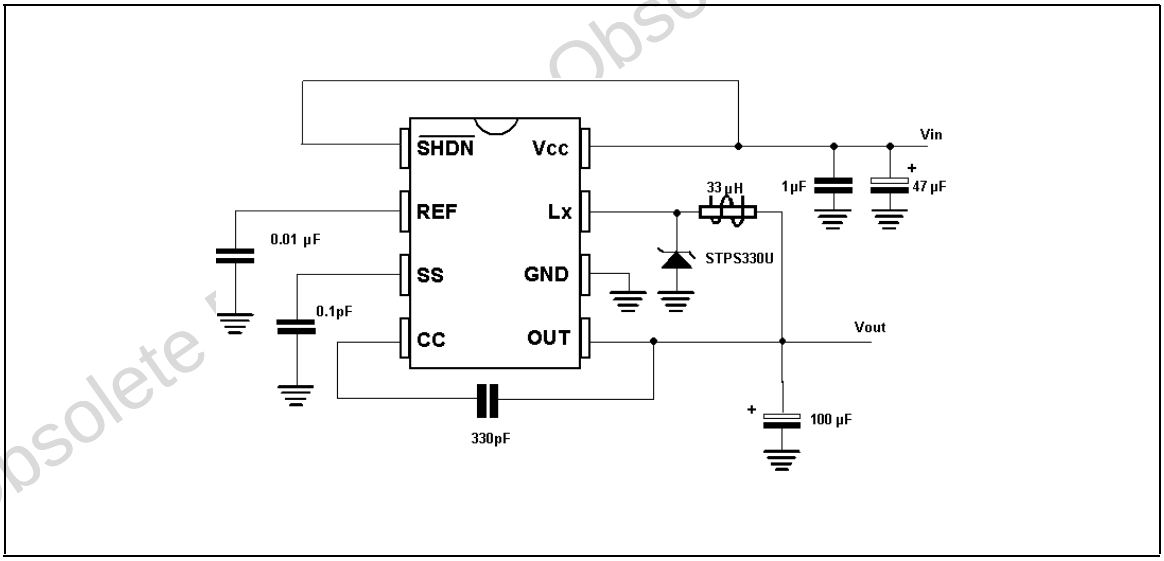
PIN DESCRIPTION

Pin N°	Symbol	Name and Function
1	$\overline{SHDN}$	Shutdown control (active low): If connected to GND the IC is in shutdown. Connect to V_{CC} for normal operation (ON MODE)
2	REF	Reference Output Voltage: (1.25V): Bypass to GND with a capacitor that does not exceed 47nF
3	SS	Soft Start: a capacitor between SS and GND provides soft-start and short-circuit protections.
4	CC	Compensation Capacitor Input: externally compensates the outer (voltage) feedback loop. Connect to OUT with 330pF capacitor
5	OUT	Output Voltage Sense Input: provides regulation of feedback sensing. Connect to 5V output.
6	GND	Ground
7	LX	Switch Output. Drain of internal P-Channel Power MOSFET
8	V_{CC}	Supply Voltage Input. Bypass to GND with 1µF ceramic capacitance and large value electrolytic capacitor in parallel. The 1µF capacitor must be as close as possible to the GND and V_{CC} pins

ELECTRICAL CHARACTERISTICS (V_{CC}=5V, I_O = 0mA, $T_A = T_{MIN}$ to T_{MAX}, unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{CC}	Input Voltage		4		11	V
V_O	Output Voltage	V_{CC} = 6 to 11V I_O =0 to 450mA	4.75	5	5.25	V
ΔV_O	Line Regulation	V_{CC} = 5.2 to 11V		0.15		%/V
ΔV_O	Load Regulatio	I_O = 0 to 450mA		0.005		%/mA
η	Power Efficency	I_O =300mA		92		%
I_{SUPPLY}	Supply Current	ON Mode OFF Mode, $\overline{SHDN}$=0		0.8 0.3	2.5 100	mA µA
V_{IH}	SHDN Input High Threshold		2			V
V_{IL}	SHDN Input Low Threshold				0.25	V
I_{SHDN}	Shutdown Input Leakage Current				1	µA
V_{LOCK}	Under Voltage Lockout	V_{CC} Falling		2.7	3	V
$R_{DS(on)}$	LX On Resistance	I_{LX}=500mA		0.5		Ω
I_{LX}	LX Leakage Current	V_{CC} = 12V V_{LX} = 0V		1		µA
V_{REF}	Reference Voltage	T_A = 25°C	1.17	1.24	1.31	V
ΔV_{REF}	Temperature Reference Drift			50		ppm/°C
f_{OSC}	Switching Frequency	B series C series	180 160	200	220 280	KHz
R_C	Compensation Pin Impedance			7500		Ω

TYPICAL APPLICATION CIRCUIT



TYPICAL PERFORMANCE CHARACTERISTICS (unless otherwise specified T_j = 25°C

Figure 1 : Efficency vs Output Current

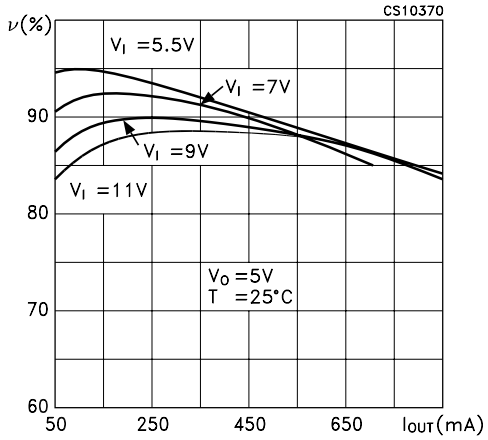


Figure 2 : Supply Current vs Temperature

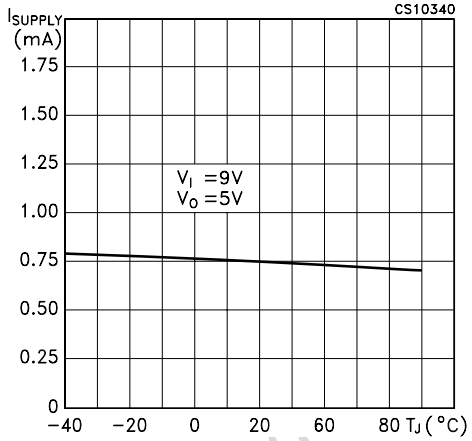


Figure 3 : Oscillator Frequency vs Temperature

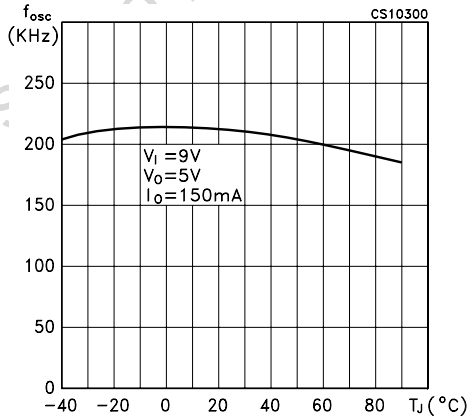


Figure 4 : Oscillator Frequency vs Input Voltage

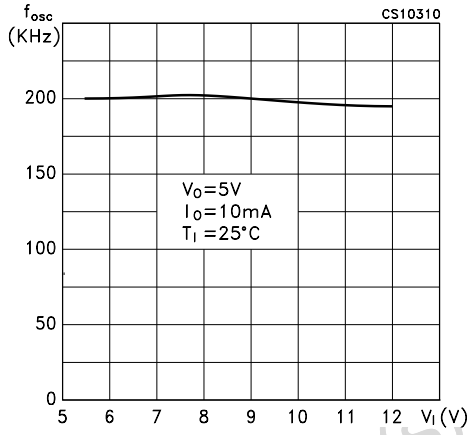


Figure 5 : Peak Inductor Current vs Output Current

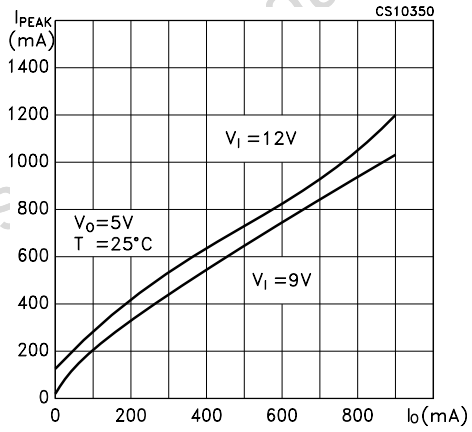


Figure 6 : Output Voltage vs Output Current

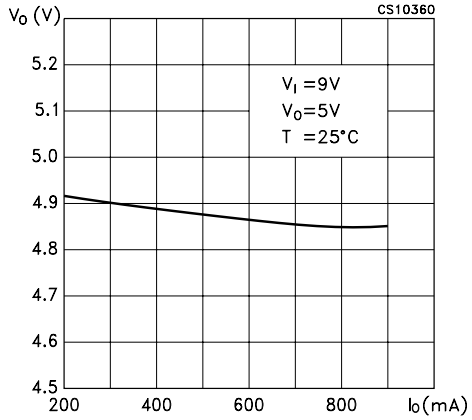
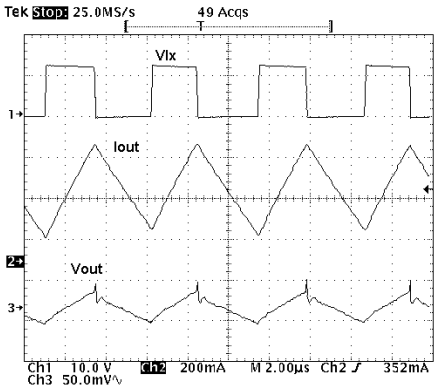
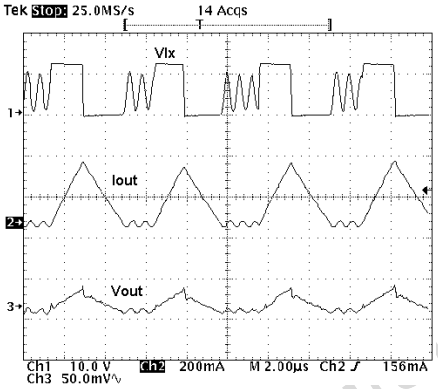


Figure 7 : Switching Waveforms, Continuous Conduction



V_I=6V to 11V, I_O=300mA

Figure 8 : Switching Waveforms, Discontinuous Conduction



V_I=6V to 11V, I_O=300mA

Figure 9 : Line Transient

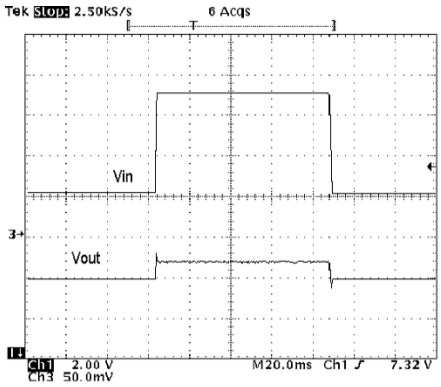
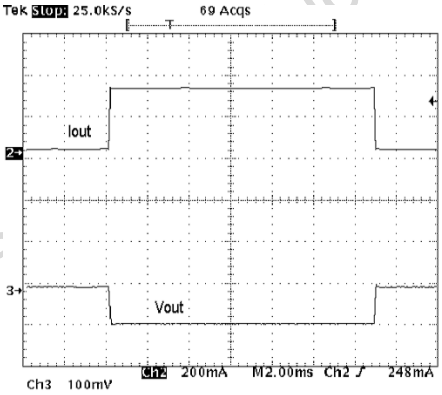
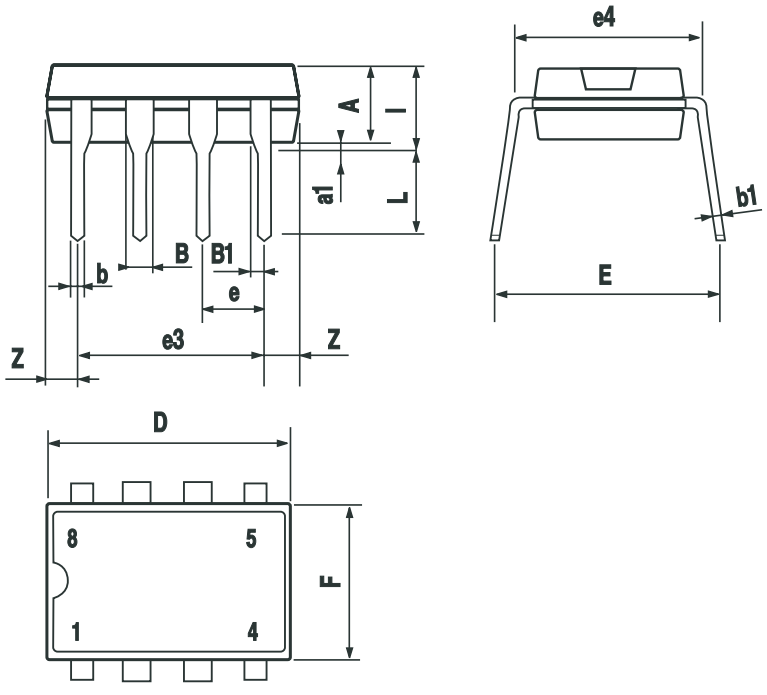


Figure 10 : Load Transient



Plastic DIP-8 MECHANICAL DATA

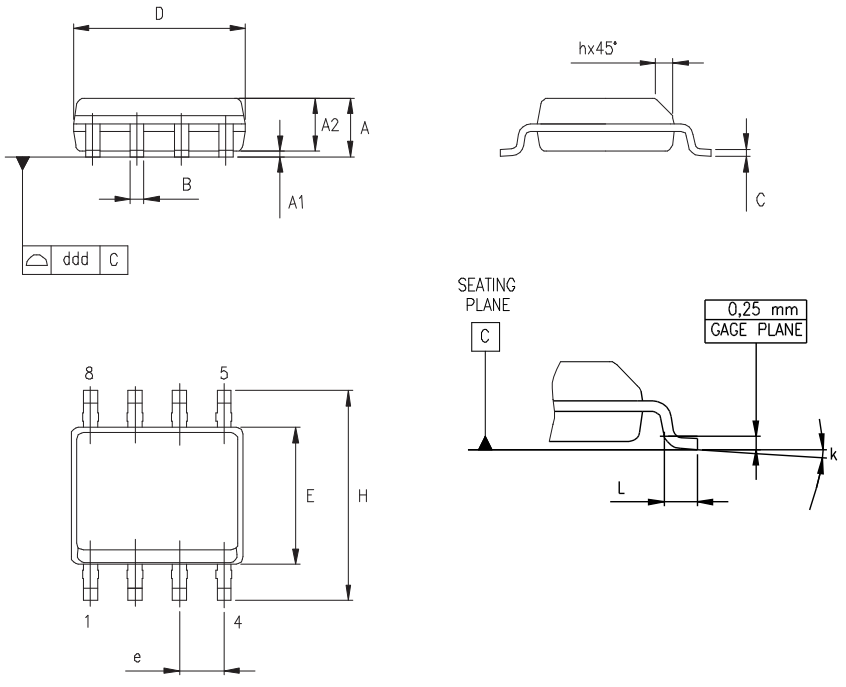
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A		3.3			0.130	
a1	0.7			0.028		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.5	0.015		0.020
D			9.8			0.386
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3			0.130	
Z	0.44		1.6	0.017		0.063



P001F

SO-8 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	1.35		1.75	0.053		0.069
A1	0.10		0.25	0.04		0.010
A2	1.10		1.65	0.043		0.065
B	0.33		0.51	0.013		0.020
C	0.19		0.25	0.007		0.010
D	4.80		5.00	0.189		0.197
E	3.80		4.00	0.150		0.157
e		1.27			0.050	
H	5.80		6.20	0.228		0.244
h	0.25		0.50	0.010		0.020
L	0.40		1.27	0.016		0.050
k	8° (max.)					
ddd			0.1			0.04



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