



# ST730A

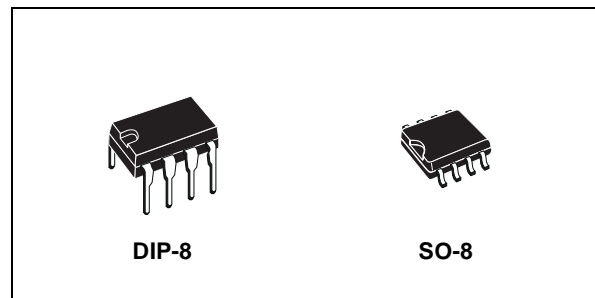
## 5V STEP-DOWN, CURRENT-MODE PWM DC-DC CONVERTERS

- UP TO 450mA LOAD CURRENTS
- 200kHz HIGH-FREQUENCY CURRENT-MODE PWM
- 85% TO 96% EFFICIENCIES
- 33 $\mu$ H OR 100 $\mu$ H PRE-SELECTED INDUCTOR VALUE, NO COMPONENT DESIGN REQUIRED
- 0.8mA QUIESCENT CURRENT
- 0.3 $\mu$ A 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

### 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%.

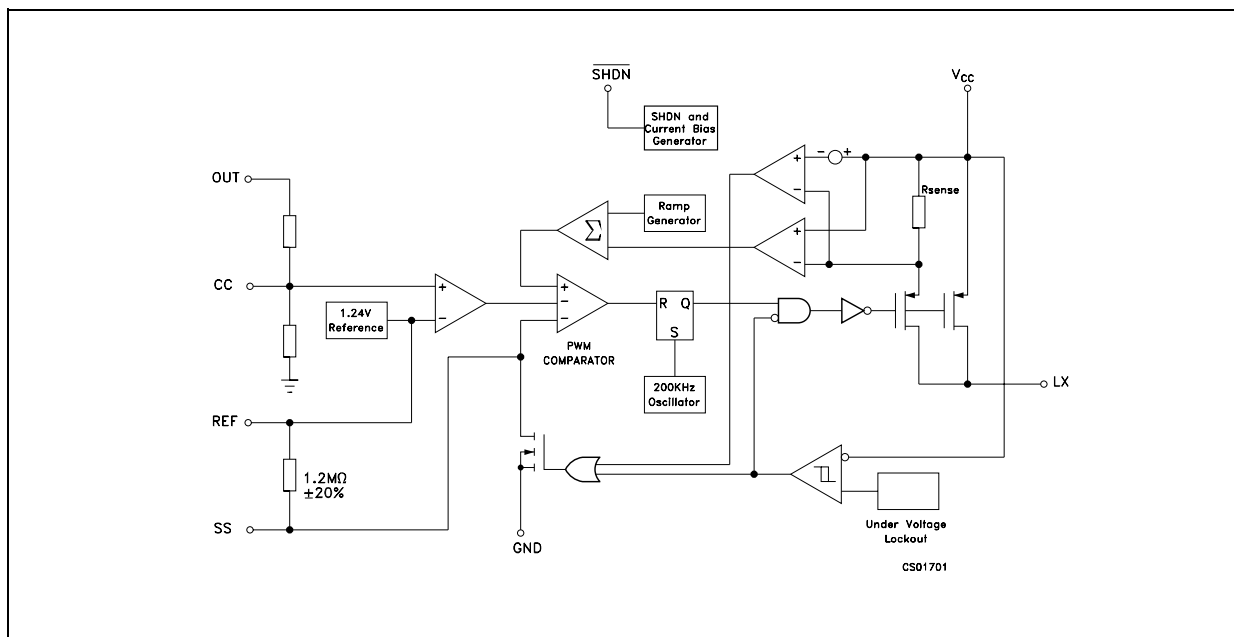
Quiescent supply current is 0.8mA and only 0.3 $\mu$ A in shutdown mode. The output does not exhibit frequency over this specified range. Pulse-width modulation (PWM) current-mode control provides



precise output regulation and excellent transient responses. Output voltage accuracy is guaranteed to be  $\pm 5\%$  over line, load, and temperature variations.

Fixed-frequency switching and absence of subharmonic ripple 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 <sup>2</sup>	Value	Unit
V <sub>CC</sub>	DC Input Voltage	-0.3 to 12	V
V <sub>LX</sub>	Switch Pin Voltage	-0.3 to (V <sub>CC</sub> + 0.3)	V
V <sub>SHDN</sub>	Shutdown Voltage (SHDN)	-0.3 to (V <sub>CC</sub> + 0.3)	V
V <sub>S</sub> , V <sub>C</sub>	Soft Start (SS) and Compensation Capacitor (CC) Pins Voltage	-0.3 to (V <sub>CC</sub> + 0.3)	V
I <sub>LX</sub>	Switching Peak Current	2	A
I <sub>REF</sub>	Reference Current	2.5	mA
P <sub>TOT</sub>	Continuous Power Dissipation at T <sub>A</sub> =70°C (DIP-8) (SO-8)	550 344	mW mW
T <sub>stg</sub>	Storage Temperature Range	-40 to +150	°C
T <sub>op</sub>	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**

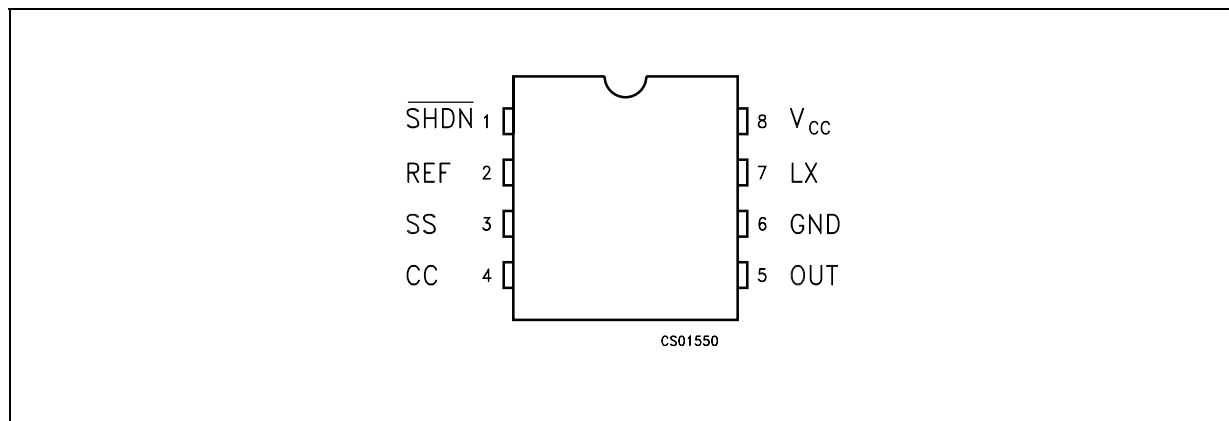
Symbol	Parameter	SO-8	DIP-8	Unit
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient (*)	160	100	°C/W

(\*) 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

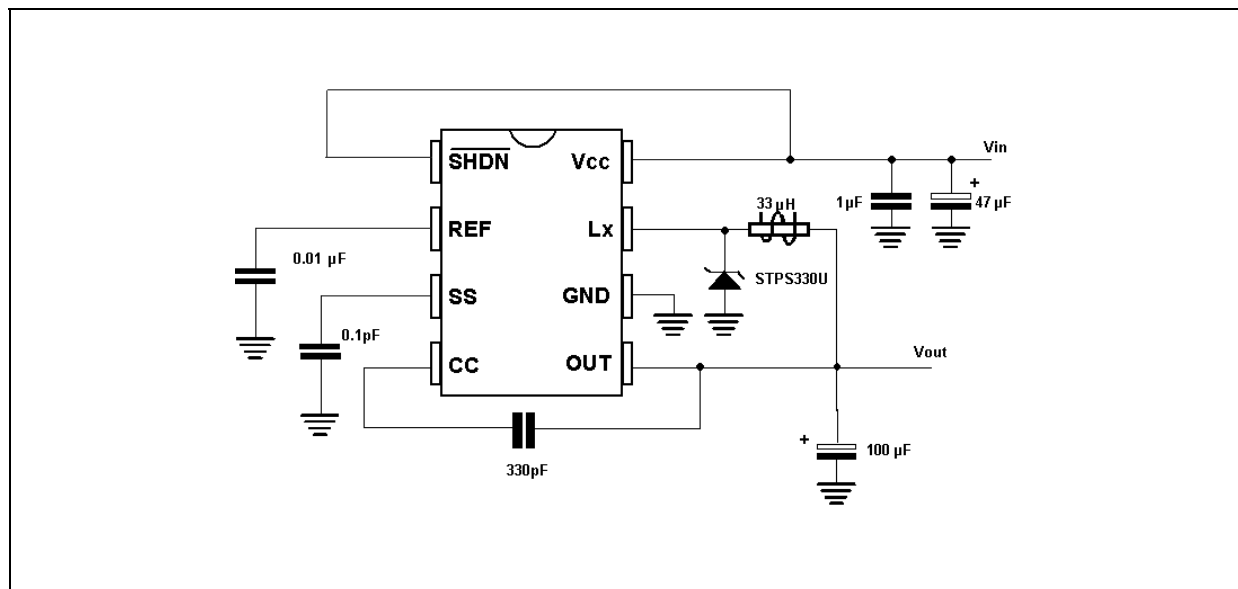
Pin N°	Symbol	Name and Function
1	SHDN	Shutdown control (active low): If connected to GND the IC is in shutdown. Connect to V <sub>CC</sub> for normal operation (ON MODE)
2	REF	Reference Output Voltage: (1.25V): Bypass to GND with a capacitor that does not exceed 47nF
3	SS	Soft Start: a capacitor between 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 <sub>CC</sub>	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 <sub>CC</sub> pins

## ST730A

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

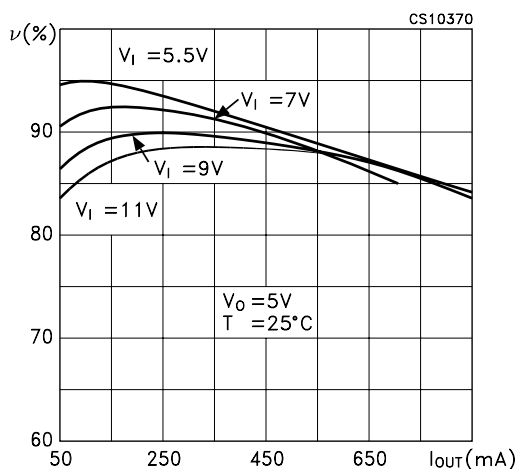
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{CC}$	Input Voltage		4		11	V
$V_O$	Output Voltage	$V_{CC} = 6$ to $11V$ $I_O = 0$ to $450mA$	4.75	5	5.25	V
$\Delta V_O$	Line Regulation	$V_{CC} = 5.2$ to $11V$		0.15		%/V
$\Delta V_O$	Load Regulatio	$I_O = 0$ to $450mA$		0.005		%/mA
$\eta$	Power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

### TYPICAL APPLICATION CIRCUIT

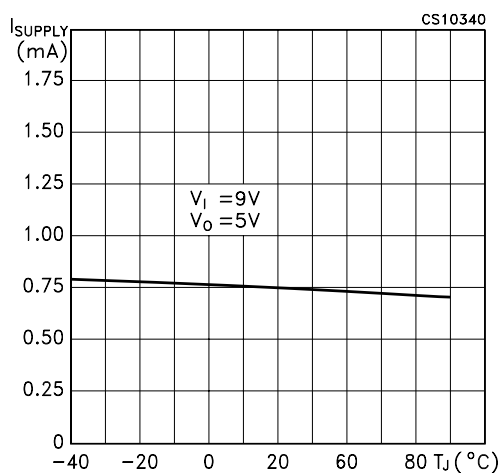


**TYPICAL PERFORMANCE CHARACTERISTICS** (unless otherwise specified  $T_j = 25^\circ\text{C}$ )

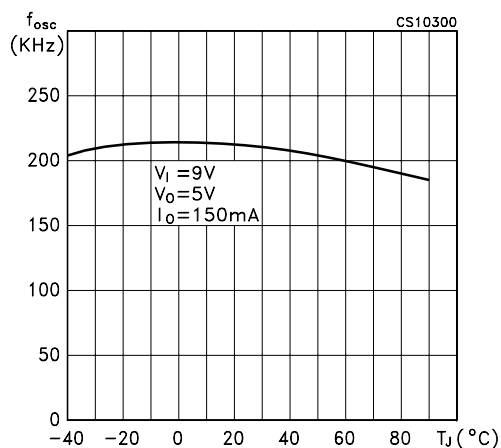
**Figure 1 : Efficiency vs Output Current**



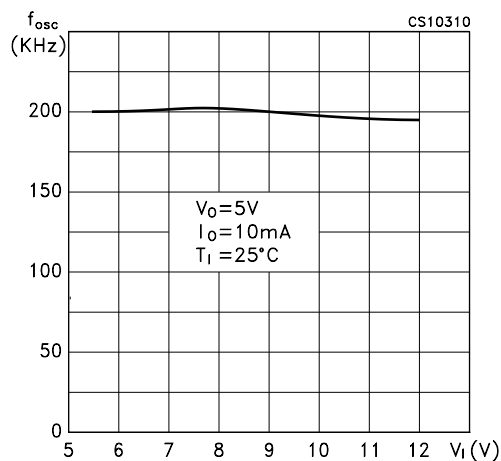
**Figure 2 : Supply Current vs Temperature**



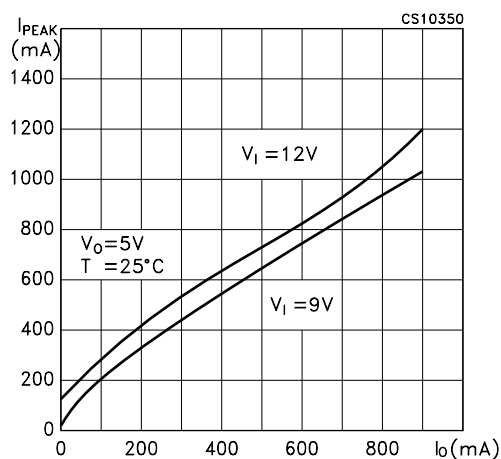
**Figure 3 : Oscillator Frequency vs Temperature**



**Figure 4 : Oscillator Frequency vs Input Voltage**



**Figure 5 : Peak Inductor Current vs Output Current**



**Figure 6 : Output Voltage vs Output Current**

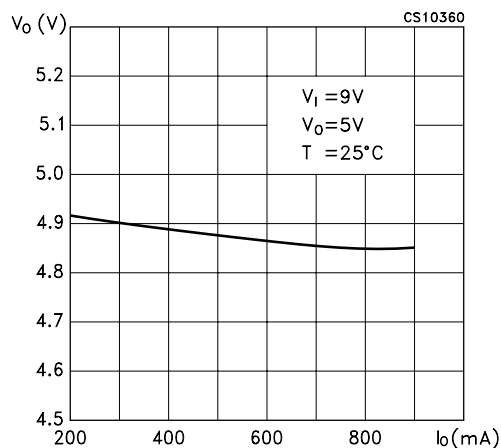


Figure 7 : Switching Waveforms, Continuous Conduction

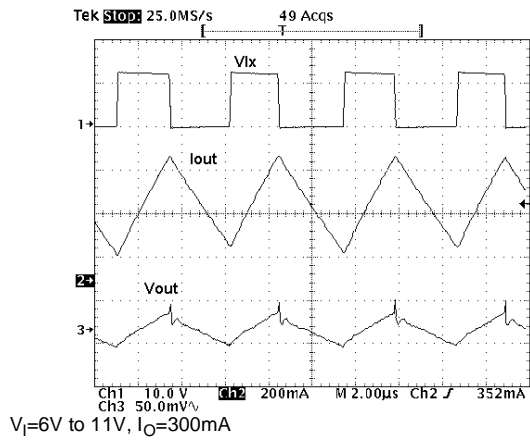


Figure 9 : Line Transient

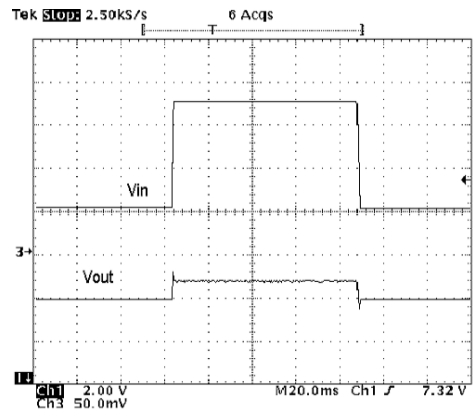


Figure 8 : Switching Waveforms, Discontinuous Conduction

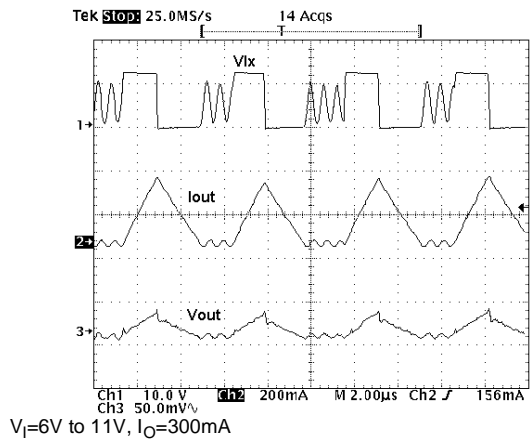
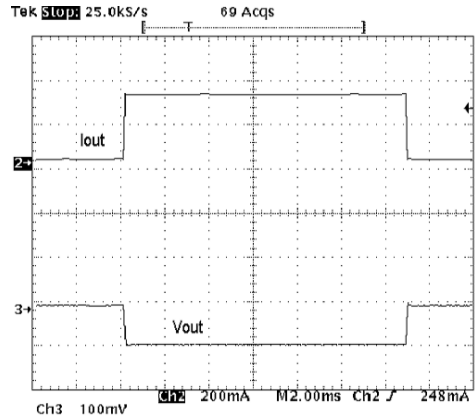
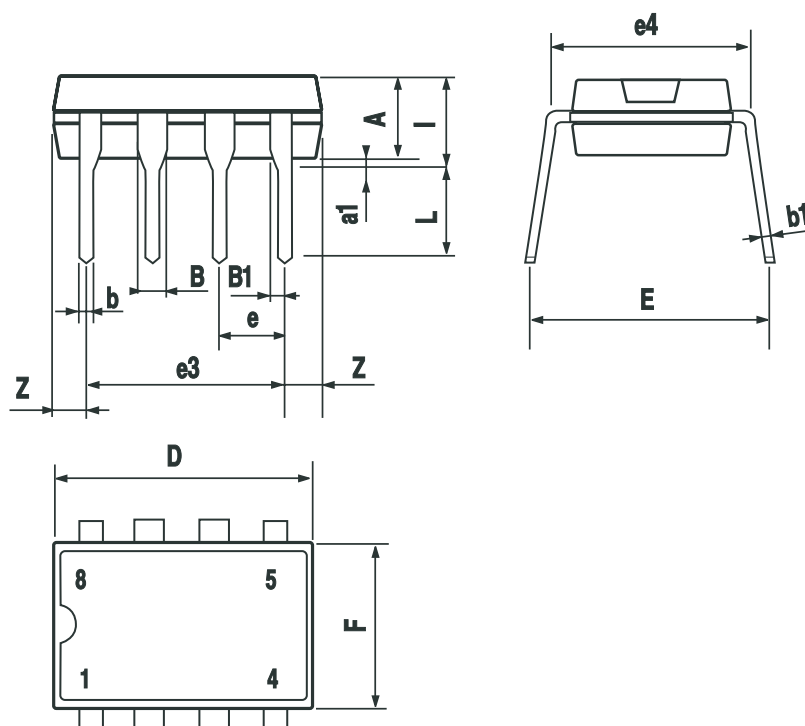


Figure 10 : Load Transient



<b>Plastic DIP-8 MECHANICAL DATA</b>
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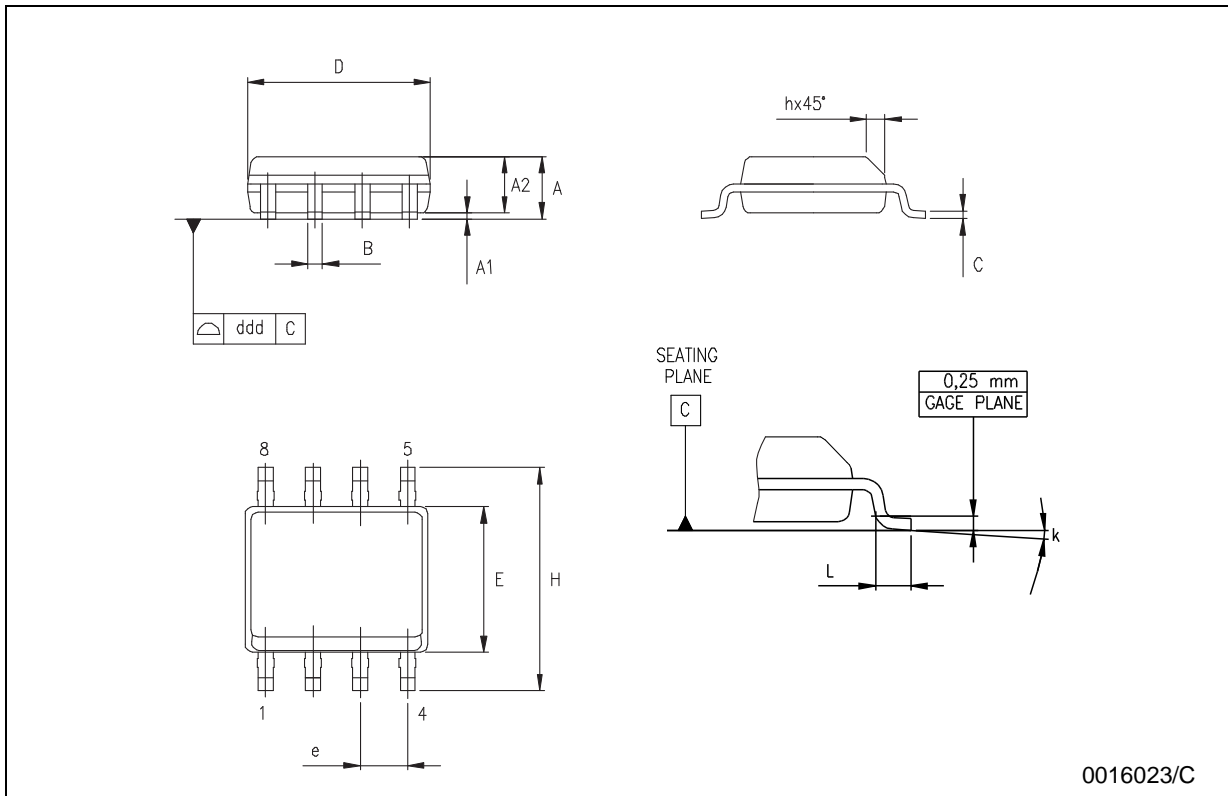
DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.3			0.130	
a1	0.7			0.028		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.5	0.015		0.020
D			9.8			0.386
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3			0.130	
Z	0.44		1.6	0.017		0.063



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**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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