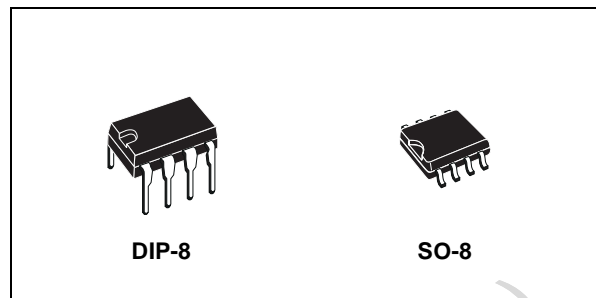




ST730A

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 μ H OR 100 μ H PRE-SELECTED INDUCTOR VALUE, NO COMPONENT DESIGN REQUIRED
- 0.8mA QUIESCENT CURRENT
- 0.3 μ 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



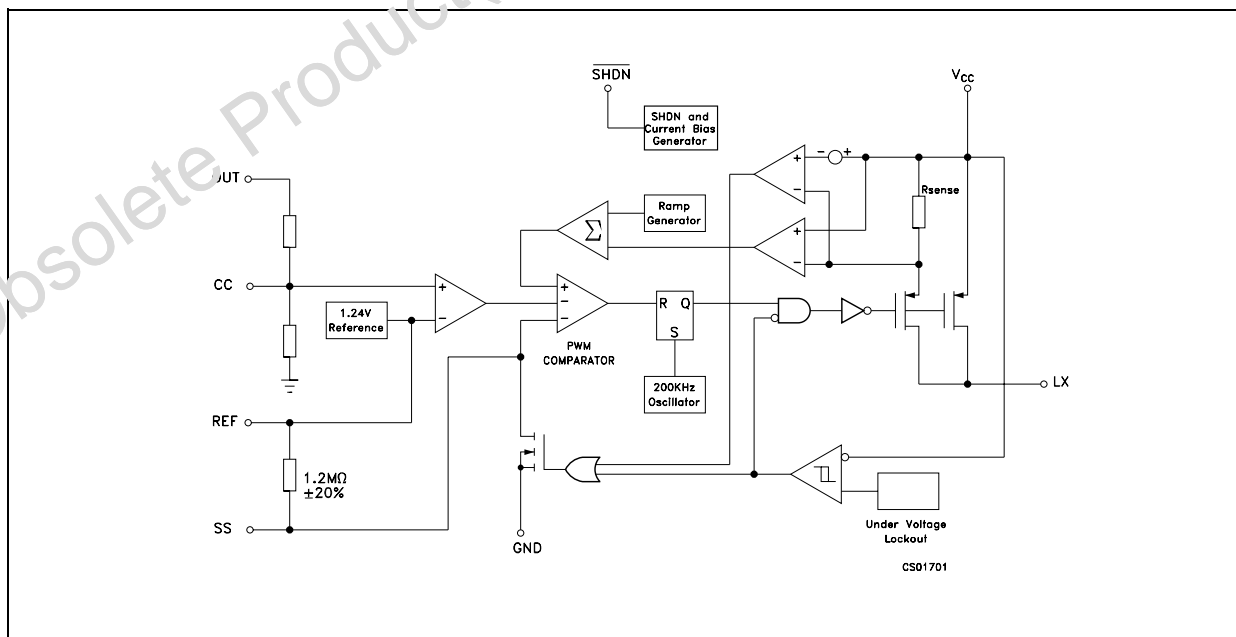
DESCRIPTION

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 μ 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



ST730A

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

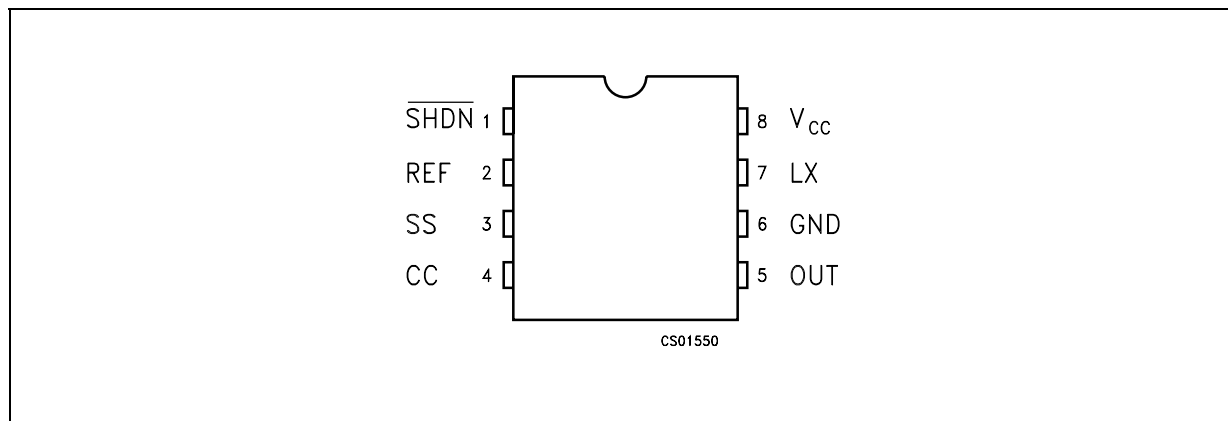
| Symbol | Parameter | SO-8 | DIP-8 | Unit |
|----------------------|---|------|-------|------|
| R _{thj-amb} | Thermal Resistance Junction-ambient (*) | 160 | 100 | °C/W |

(*) 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

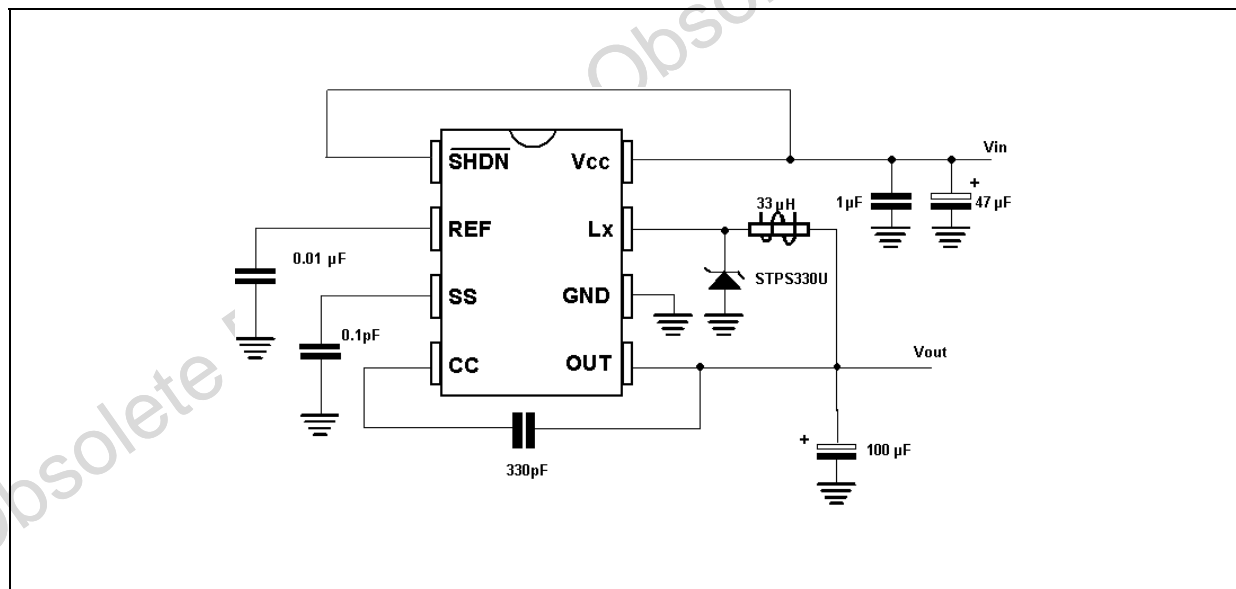
| Pin N° | Symbol | Name and Function |
|--------|-----------------|---|
| 1 | SHDN | Shutdown control (active low): If connected to GND the IC is in shutdown. Connect to V _{CC} for normal operation (ON MODE) |
| 2 | REF | Reference Output Voltage: (1.25V): Bypass to GND with a capacitor that does not 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 |

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 |
| 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 Efficiency | $I_O = 300mA$ | | 92 | | % |
| I_{SUPPLY} | Supply Current | ON Mode _____ OFF Mode, 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 | $T_A = 25^\circ C$ | 1.17 | 1.24 | 1.31 | V |
| ΔV_{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 | | Ω |

TYPICAL APPLICATION CIRCUIT



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

Figure 1 : Efficiency vs Output Current

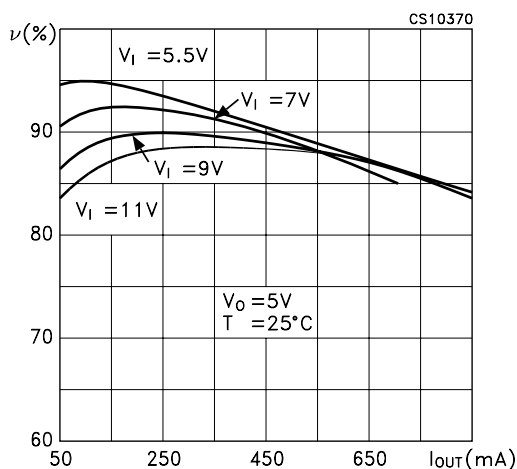


Figure 2 : Supply Current vs Temperature

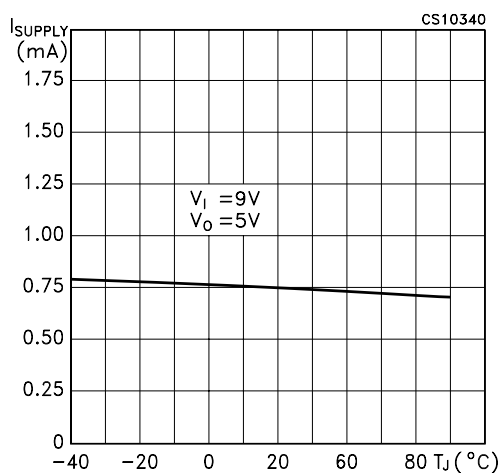


Figure 3 : Oscillator Frequency vs Temperature

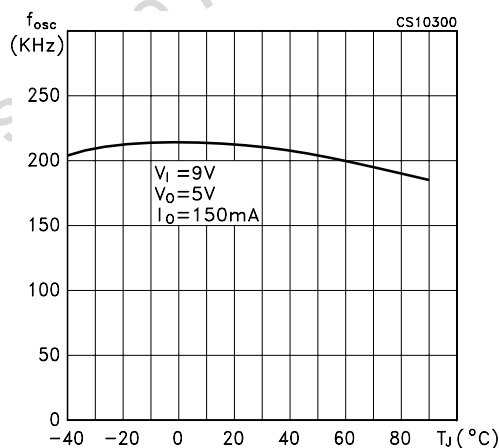


Figure 4 : Oscillator Frequency vs Input Voltage

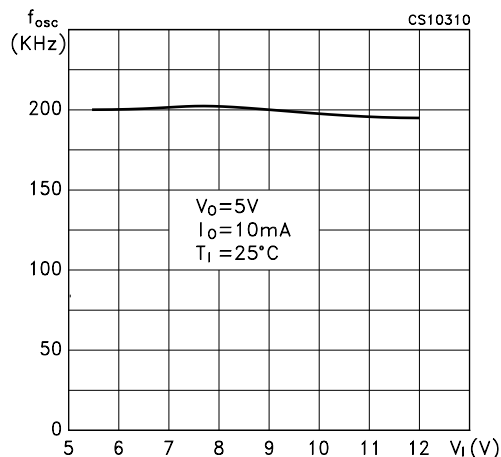


Figure 5 : Peak Inductor Current vs Output Current

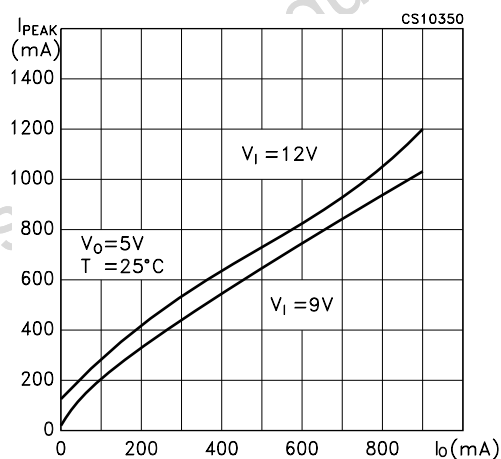


Figure 6 : Output Voltage vs Output Current

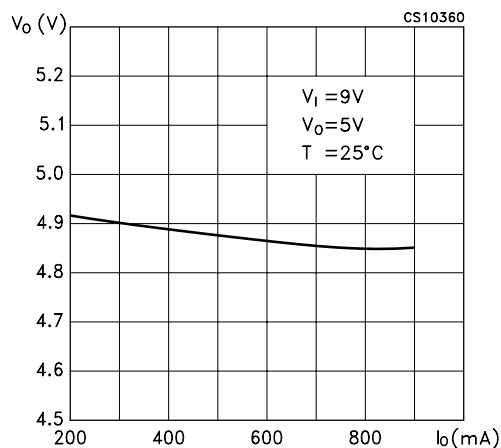


Figure 7 : Switching Waveforms, Continuous Conduction

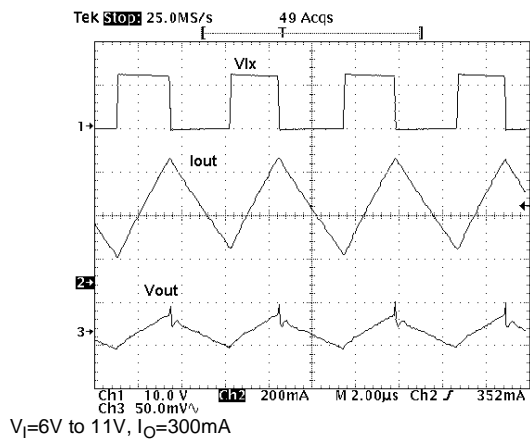


Figure 9 : Line Transient

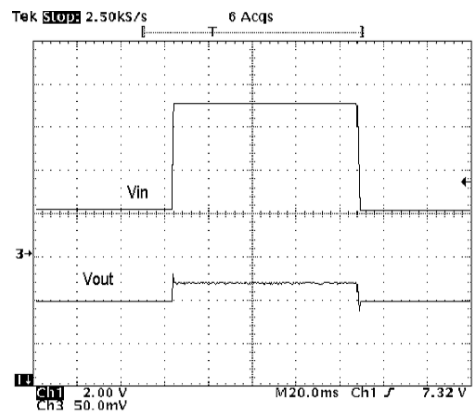


Figure 8 : Switching Waveforms, Discontinuous Conduction

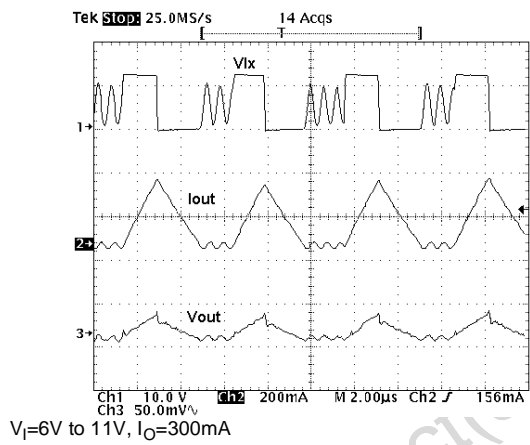
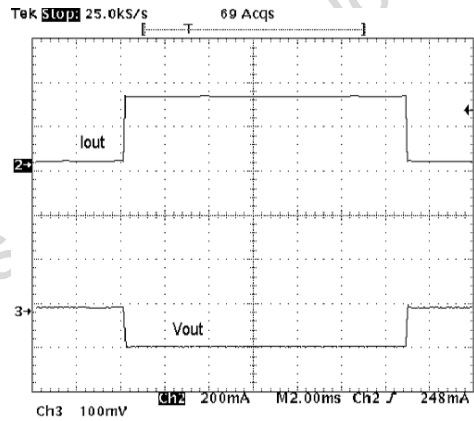


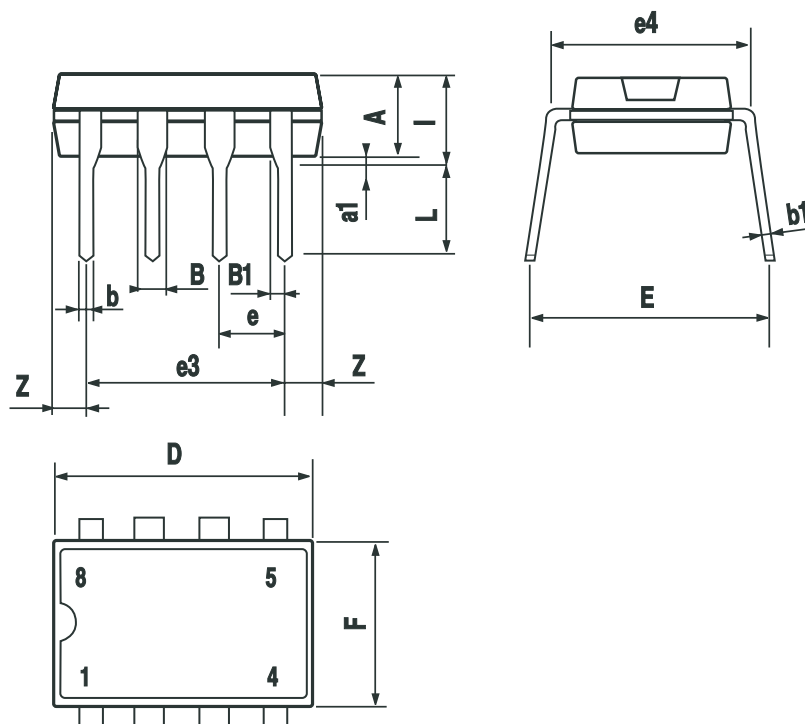
Figure 10 : Load Transient



Obsolete Product(s) - Obsolete Product(s)

| |
|--------------------------------------|
| Plastic DIP-8 MECHANICAL DATA |
|--------------------------------------|

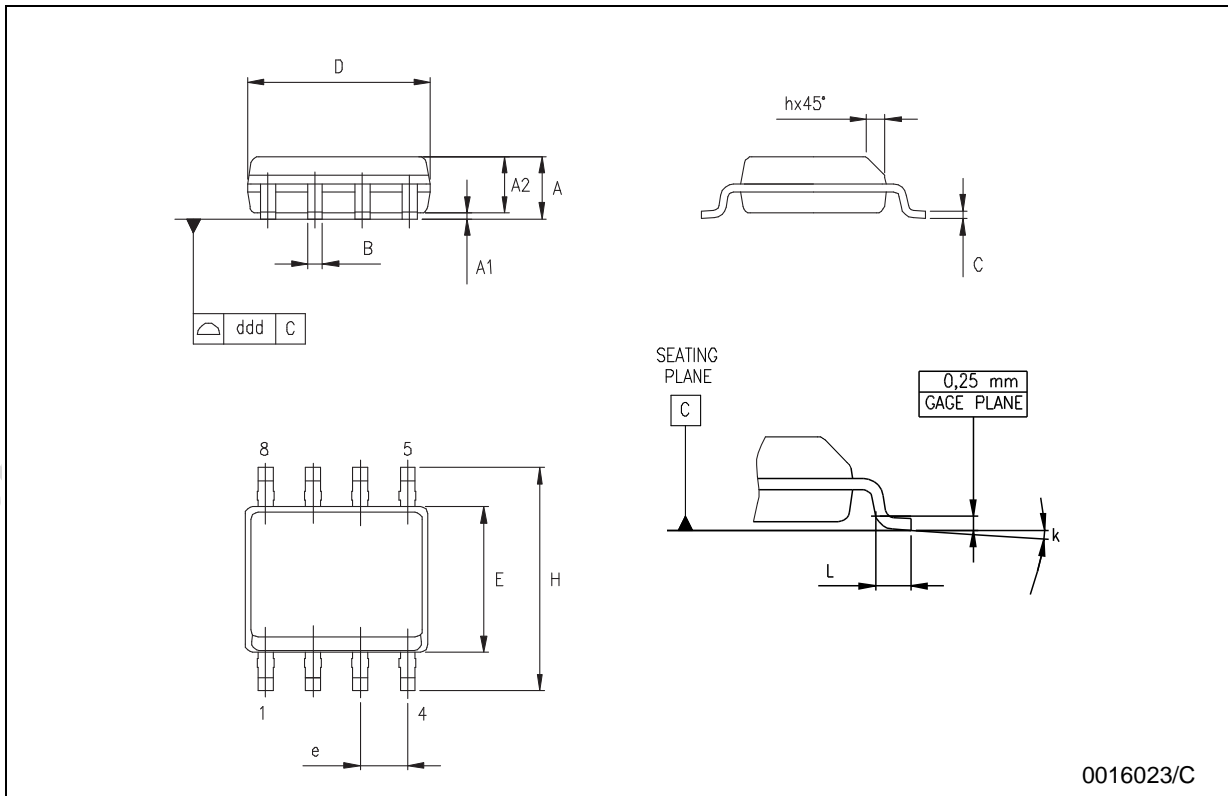
| DIM. | mm. | | | inch | | |
|------|------|------|------|-------|-------|-------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | 3.3 | | | 0.130 | |
| a1 | 0.7 | | | 0.028 | | |
| B | 1.39 | | 1.65 | 0.055 | | 0.065 |
| B1 | 0.91 | | 1.04 | 0.036 | | 0.041 |
| b | | 0.5 | | | 0.020 | |
| b1 | 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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