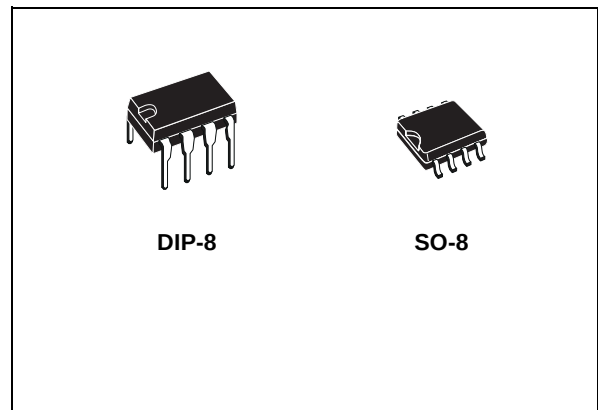




## 3.3V STEP DOWN CURRENT MODE PWM DC-DC CONVERTERS

- OUTPUT VOLTAGE 3.3V
- SUPPLY VOLTAGE RANGE FROM 3.3V TO 11V
- GUARANTEED OUTPUT CURRENT: 500mA
- TYPICAL OPERATION FREQUENCY: 200KHz
- VERY LOW QUIESCENT CURRENT: 0.6mA ON MODE 0.2 $\mu$ A OFF MODE
- SWITCH ON/OFF CONTROL
- TYPICAL EFFICIENCY: 90%
- OPERATING TEMPERATURE RANGE: -40°C TO 85°C
- AVAILABLE IN SO-8 AND DIP-8 PACKAGES



### DESCRIPTION

The ST763A is a step-down switching regulator. It operates from 3.3V to 11V giving a fixed 3.3V output voltage, delivering up to 500mA. The main features are typical efficiency of 90%, quiescent current of 0.6mA, and only 0.2 $\mu$ A in shut-down.

The PWM current mode control provides precise output regulation and very good transient response. Output voltage accuracy is guaranteed to be  $\pm 5\%$  over line, load and temperature variations. A minimum number of external

components is used and the fixed frequency switching allows easy filtering of output ripple and noise.

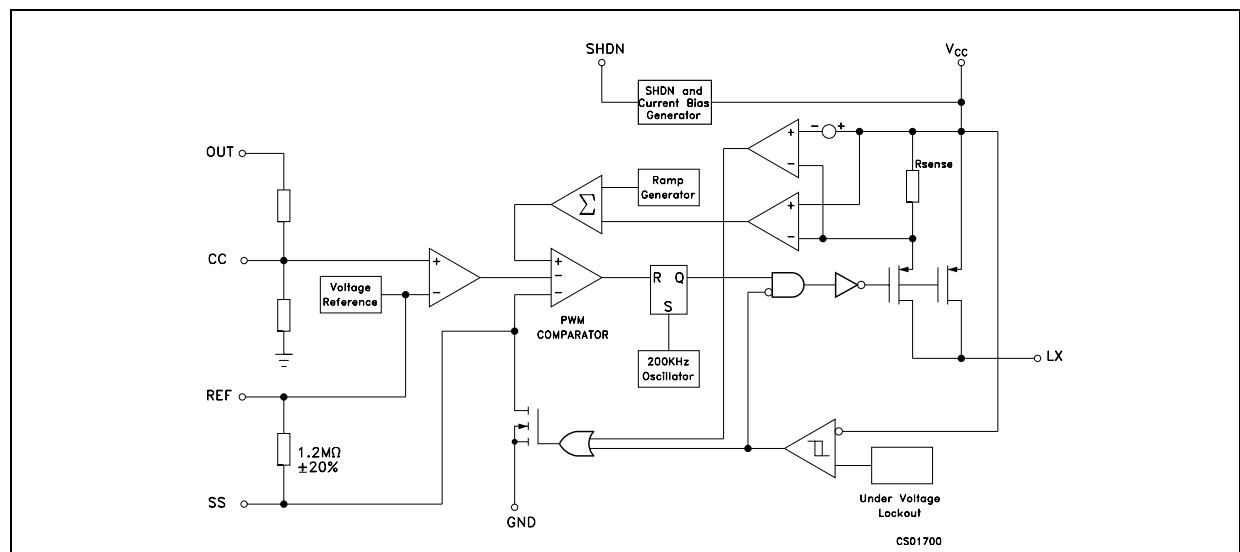
Other features of this device are cycle-by-cycle current limiting, overcurrent limiting, under voltage lockout and programmable soft-start protection.

A 22 $\mu$ H inductor works in most applications, so no sophisticated design is necessary.

Package available are SO-8 and DIP-8.

Typical application are in 5V to 3.3V converters, cellular phones, portable instruments, hand-held computers, and peripherals.

### SCHEMATIC DIAGRAM



## ST763A SERIES

### 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)<br>(SO-8) | 550<br>344                      | mW<br>mW |
| T <sub>stg</sub>                | Storage Temperature Range                                              | -40 to +150                     | °C       |
| T <sub>op</sub>                 | Operating Junction Temperature Range (AC series)<br>(AB series)        | 0 to +70<br>-40 to +85          | °C<br>°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

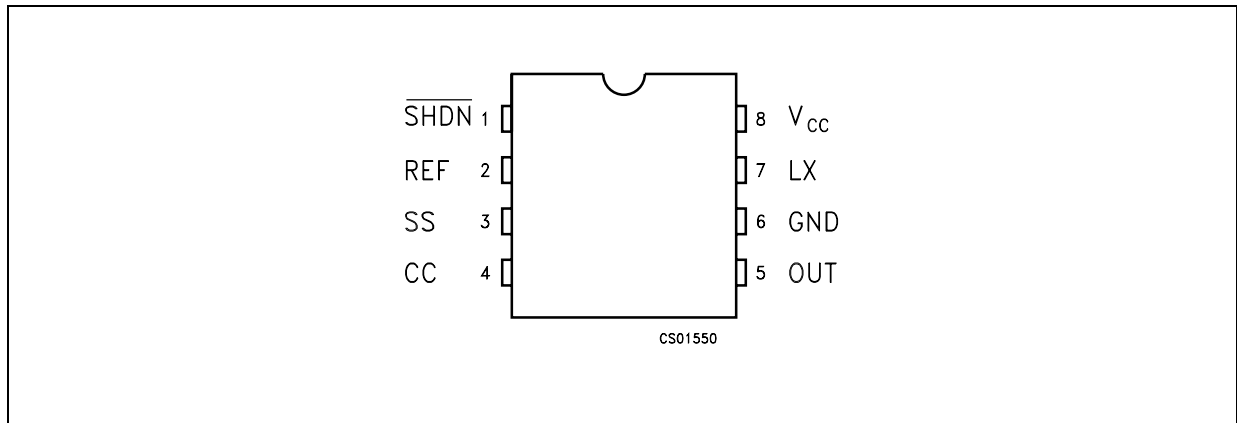
| Symbol               | Parameter                               | SO-8 | DIP-8 | Unit |
|----------------------|-----------------------------------------|------|-------|------|
| R <sub>thj-amb</sub> | Thermal Resistance Junction-ambient (*) | 160  | 100   | °C/W |

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

### ORDERING CODES

| TYPE    | DIP8     | SO-8     | SO-8 (T&R) |
|---------|----------|----------|------------|
| ST763AB | ST763ABN | ST763ABD | ST763ABDTR |
| ST763AC | ST763ACN | ST763ACD | ST763ACDTR |

## CONNECTION DIAGRAM (top view)



## PIN DESCRIPTION

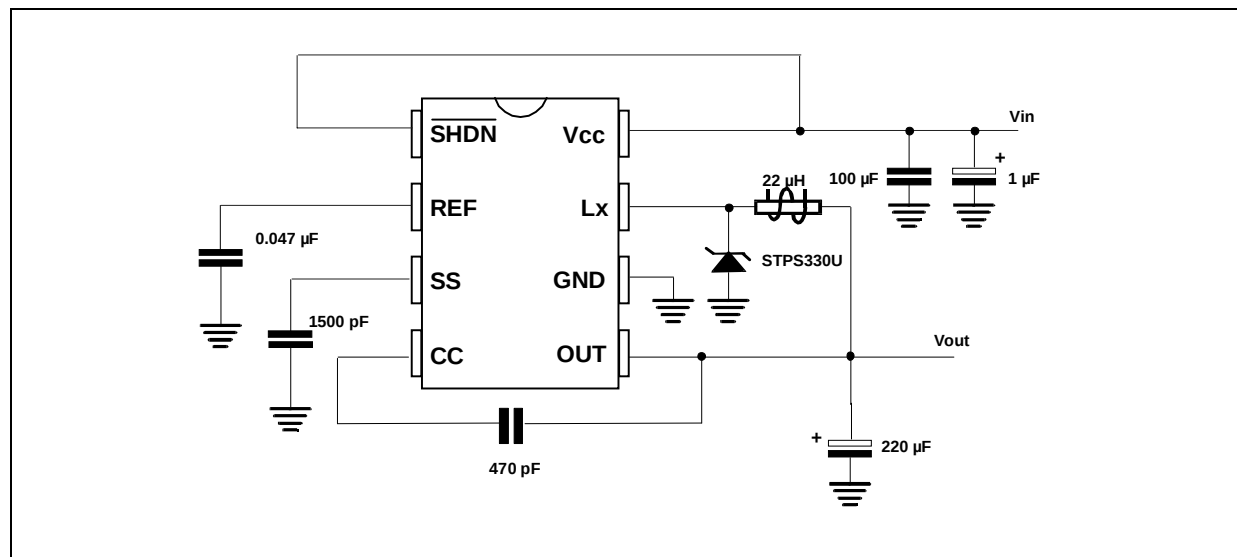
| Pin N° | Symbol          | Name and Function                                                                                                                                                                                       |
|--------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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 47nF capacitor                                                                                                                                     |
| 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 3.3V 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 |

## ST763A SERIES

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

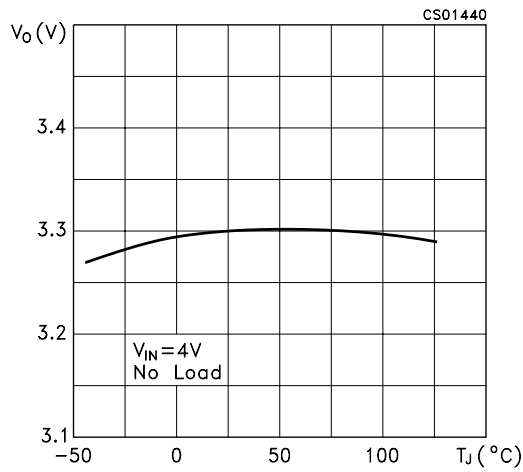
| Symbol           | Parameter                      | Test Conditions                                                                             | Min.           | Typ.       | Max.           | Unit            |
|------------------|--------------------------------|---------------------------------------------------------------------------------------------|----------------|------------|----------------|-----------------|
| $V_{CC}$         | Input Voltage                  |                                                                                             | 3.3            |            | 11             | V               |
| $V_O$            | Output Voltage                 | $V_{CC} = 4$ to $11V$ $I_O = 0$ to $300mA$<br>$V_{CC} = 4.75$ to $11V$ $I_O = 0$ to $500mA$ | 3.135<br>3.135 | 3.3<br>3.3 | 3.465<br>3.465 | V<br>V          |
| $\Delta V_O$     | Line Regulation                |                                                                                             |                | 0.13       |                | %/V             |
| $\Delta V_O$     | Load Regulatio                 | $I_O = 1$ to $500mA$                                                                        |                | 0.005      |                | %/mA            |
| $\eta$           | Power Efficiency               | $I_O = 300mA$<br>$I_O = 100mA$                                                              |                | 88<br>90   |                | %<br>%          |
| $I_{SUPPLY}$     | Supply Current                 | ON Mode (Including Switch Current)<br>OFF Mode                                              |                | 0.6<br>0.2 | 2.5<br>100     | mA<br>$\mu A$   |
| $V_{IH}$         | 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               | $I_{LX}=500mA$                                                                              |                | 1          |                | $\Omega$        |
| $I_{LEAK}$       | LX Leakage Current             | $V_{CC} = 12V$ $V_{LX} = 0V$                                                                |                | 10         |                | nA              |
| $V_{REF}$        | Reference Voltage              | $T_A = 25^\circ C$                                                                          | 1.18           | 1.25       | 1.32           | V               |
| $\Delta V_{REF}$ | Tempeperature Reference Drift  | $T_A = T_{MIN}$ to $T_{MAX}$                                                                |                | 50         |                | ppm/ $^\circ C$ |
| $f_{OSC}$        | Switching Frequency            |                                                                                             | 159            | 200        | 212.5          | KHz             |
| $R_C$            | Compensation Pin Impedance     |                                                                                             |                | 7500       |                | $\Omega$        |

## TYPICAL APPLICATION CIRCUIT

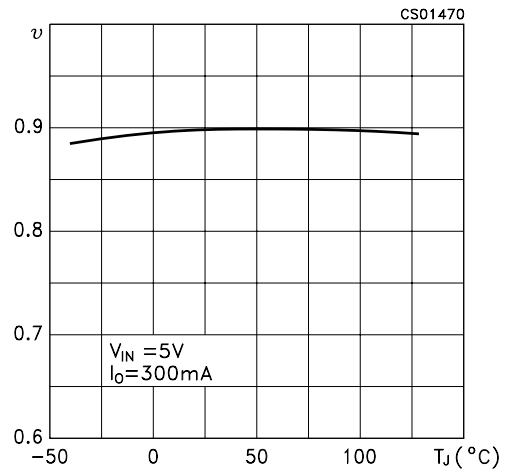


**TYPICAL PERFORMANCE CHARACTERISTICS** (unless otherwise specified  $T_J = 25^\circ\text{C}$ )

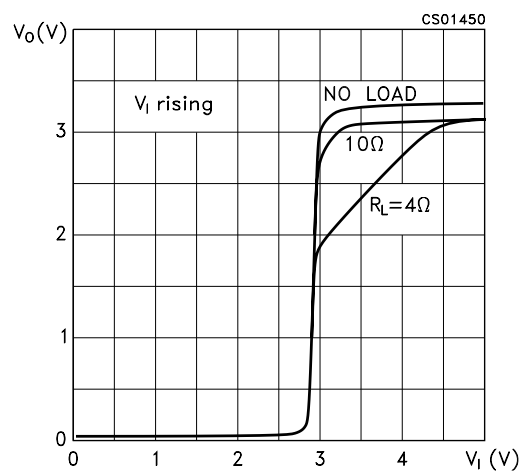
**Figure 1 : Output Voltage vs Temperature**



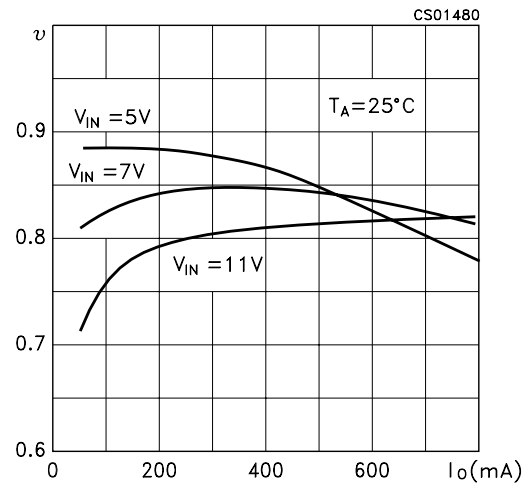
**Figure 4 : Efficiency vs Temperature**



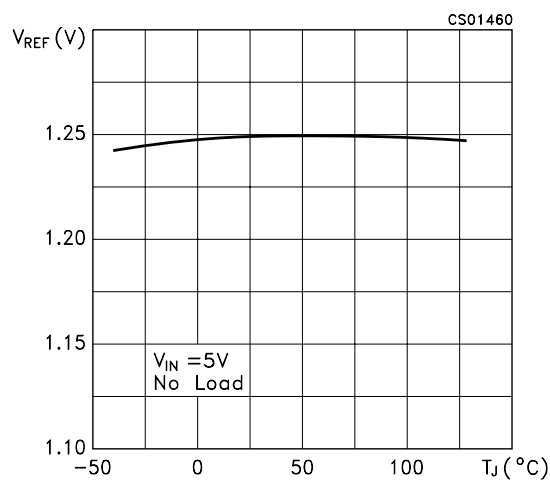
**Figure 2 : Output Voltage vs Input Voltage**



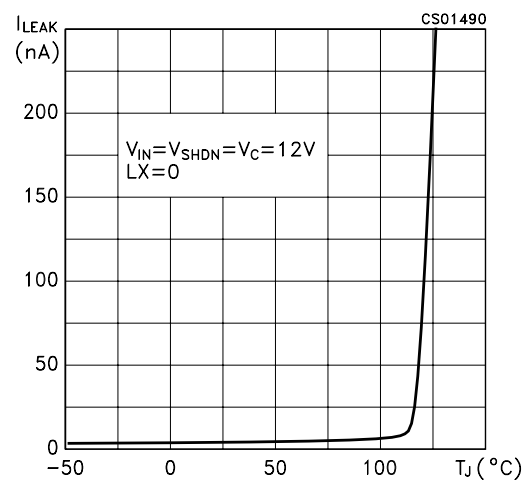
**Figure 5 : Efficiency vs Output Current**



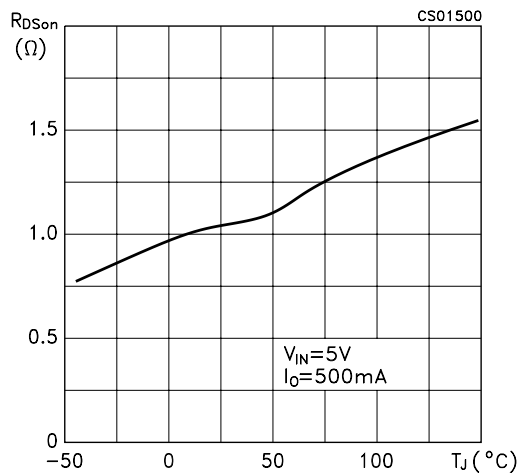
**Figure 3 : Reference Voltage vs Temperature**



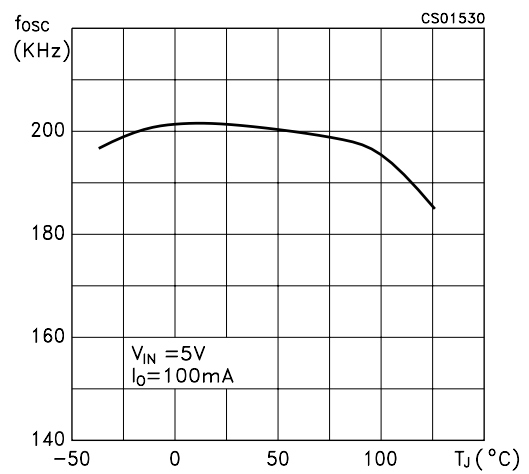
**Figure 6 : LX Leakage Current vs Temperature**



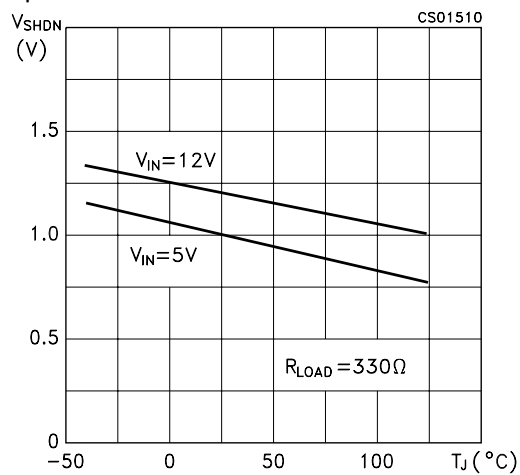
**Figure 7 : LX ON Resistance vs Temperature**



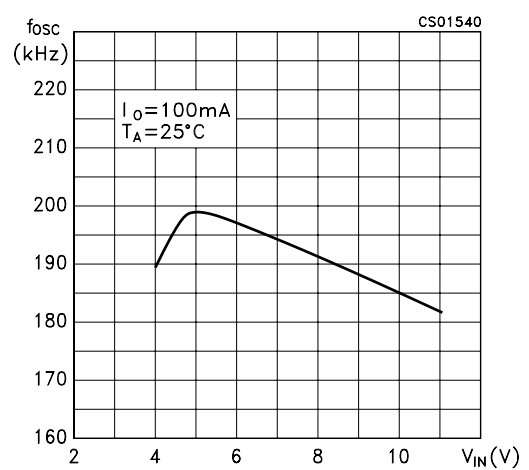
**Figure 10 : Oscillator Frequency vs Temperature**



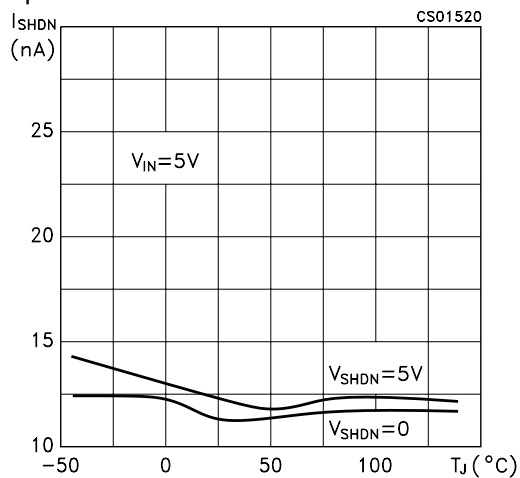
**Figure 8 : Shutdown Input Threshold vs Temperature**



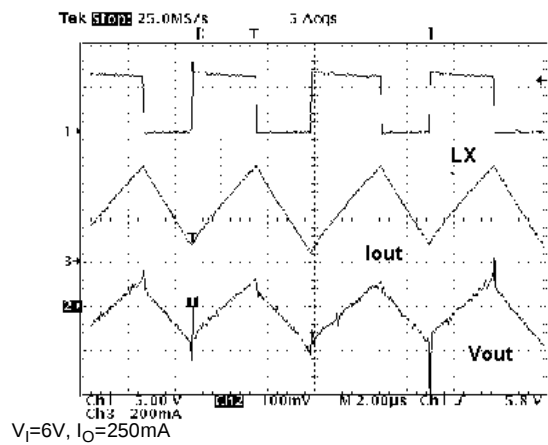
**Figure 11 : Oscillator Frequency vs Input Voltage**

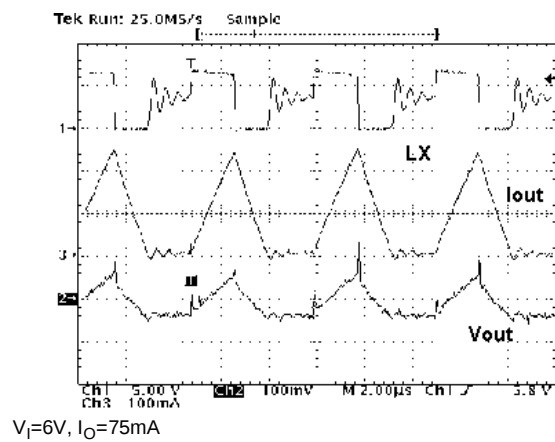
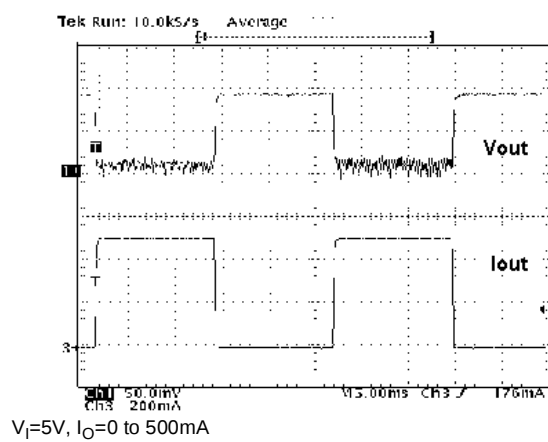
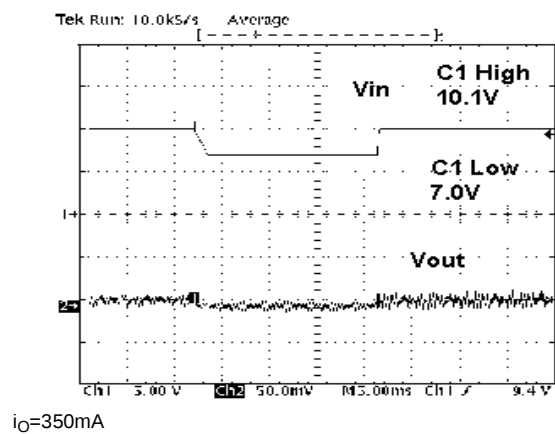


**Figure 9 : Shutdown Input Leakage Current vs Temperature**



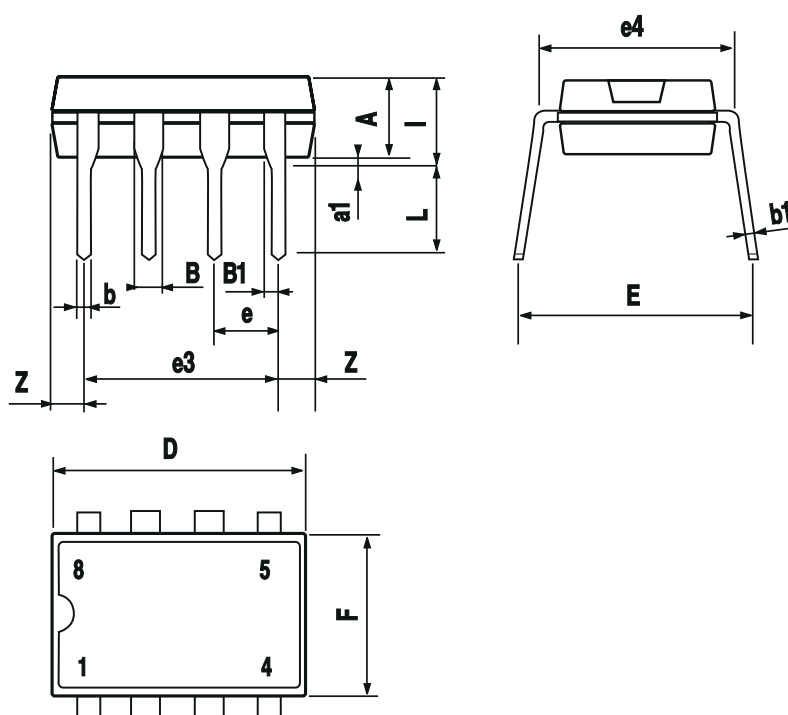
**Figure 12 : Switching Waveforms, Continuous Conduction**



**Figure 13 : Switching Waveforms, Discontinuous Conduction****Figure 15 : Load Transient****Figure 14 : Line Transient**

## Plastic DIP-8 MECHANICAL DATA

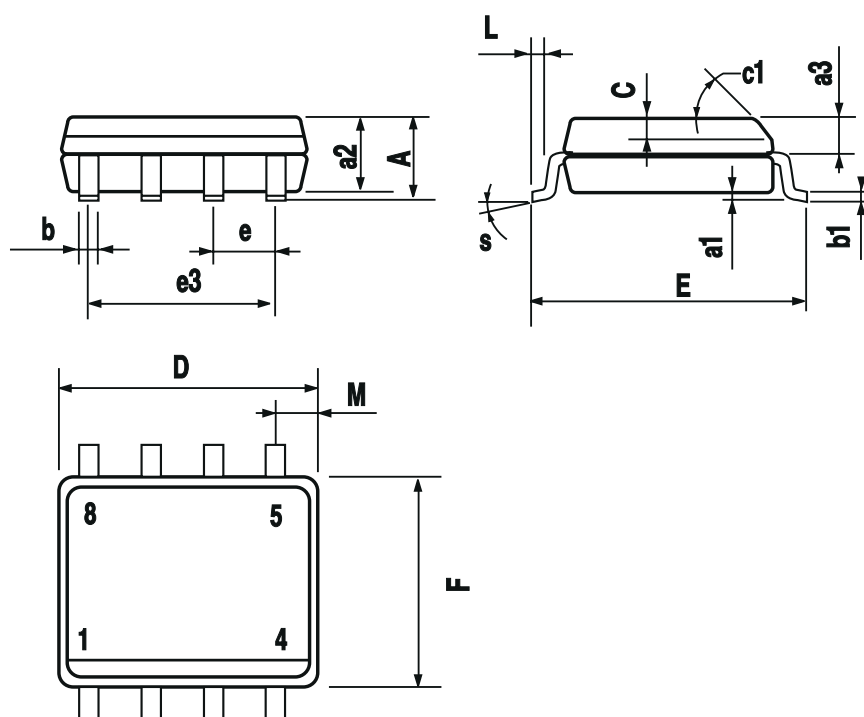
| DIM. | mm   |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP. | MAX. | MIN.  | TYP.  | MAX.  |
| A    |      | 3.3  |      |       | 0.130 |       |
| a1   | 0.7  |      |      | 0.028 |       |       |
| B    | 1.39 |      | 1.65 | 0.055 |       | 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 |
| l    |      |      | 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    |           |      | 1.75 |       |       | 0.068 |
| a1   | 0.1       |      | 0.25 | 0.003 |       | 0.009 |
| a2   |           |      | 1.65 |       |       | 0.064 |
| a3   | 0.65      |      | 0.85 | 0.025 |       | 0.033 |
| b    | 0.35      |      | 0.48 | 0.013 |       | 0.018 |
| b1   | 0.19      |      | 0.25 | 0.007 |       | 0.010 |
| C    | 0.25      |      | 0.5  | 0.010 |       | 0.019 |
| c1   | 45 (typ.) |      |      |       |       |       |
| D    | 4.8       |      | 5.0  | 0.188 |       | 0.196 |
| E    | 5.8       |      | 6.2  | 0.228 |       | 0.244 |
| e    |           | 1.27 |      |       | 0.050 |       |
| e3   |           | 3.81 |      |       | 0.150 |       |
| F    | 3.8       |      | 4.0  | 0.14  |       | 0.157 |
| L    | 0.4       |      | 1.27 | 0.015 |       | 0.050 |
| M    |           |      | 0.6  |       |       | 0.023 |
| S    | 8 (max.)  |      |      |       |       |       |



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