



## ST763A series

### 3.3V Step down current mode PWM DC-DC converters

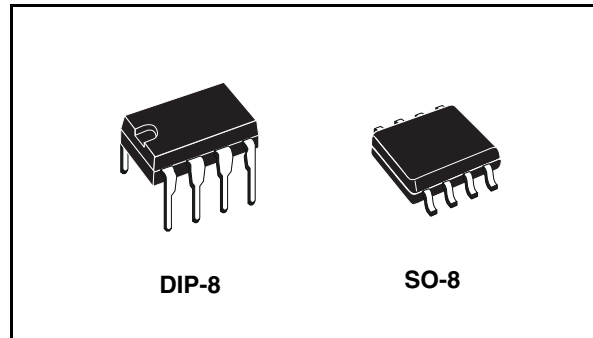
#### Feature summary

- 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 0.2µA 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 mainly features are typical efficiency of 90%, quiescent current of 0.6mA, and only 0.2µA 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 22µH 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.

#### Order code

| Part number | Package  |          | Packaging  |
|-------------|----------|----------|------------|
|             | DIP-8    | SO-8     | SO-8 (T&R) |
| ST763AB     | ST763ABN | ST763ABD | ST763ABDTR |
| ST763AC     | ST763ACN | ST763ACD | ST763ACDTR |

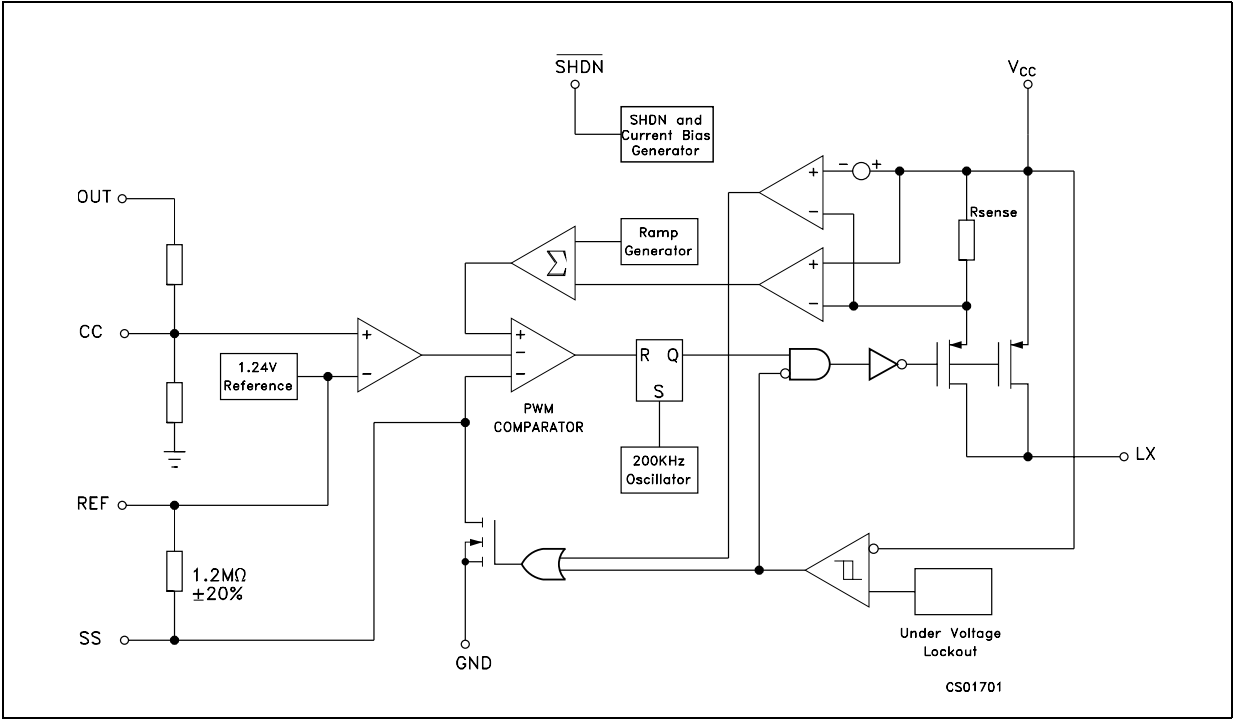
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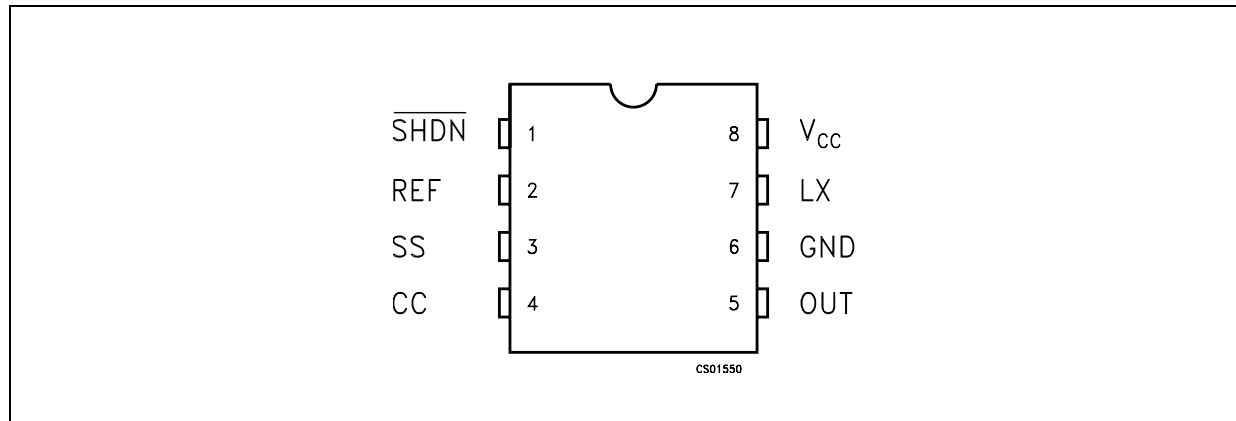
# 1 Diagram

Figure 1. Schematic diagram



## 2 Pin configuration

**Figure 2. Pin connections (top view)**



**Table 1. Pin description**

| Pin N° | Symbol                   | Name and function                                                                                                                                                                                             |
|--------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | $\overline{\text{SHDN}}$ | 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 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      | $V_{CC}$                 | Supply voltage input. Bypass to GND with 1 $\mu$ F ceramic capacitance and large value electrolytic capacitor in parallel. The 1 $\mu$ F capacitor must be as close as possible to the GND and $V_{CC}$ pins. |

### 3 Maximum ratings

**Table 2. Absolute maximum ratings**

| Symbol     | Parameter                                                    |           | 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 $T_A=70^\circ\text{C}$       | DIP-8     | 550                        | mW               |
|            |                                                              | SO-8      | 344                        |                  |
| $T_{stg}$  | Storage temperature range                                    |           | -40 to +150                | $^\circ\text{C}$ |
| $T_{op}$   | Operating junction temperature range                         | AC series | 0 to +70                   | $^\circ\text{C}$ |
|            |                                                              | AB series | -40 to +85                 |                  |

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

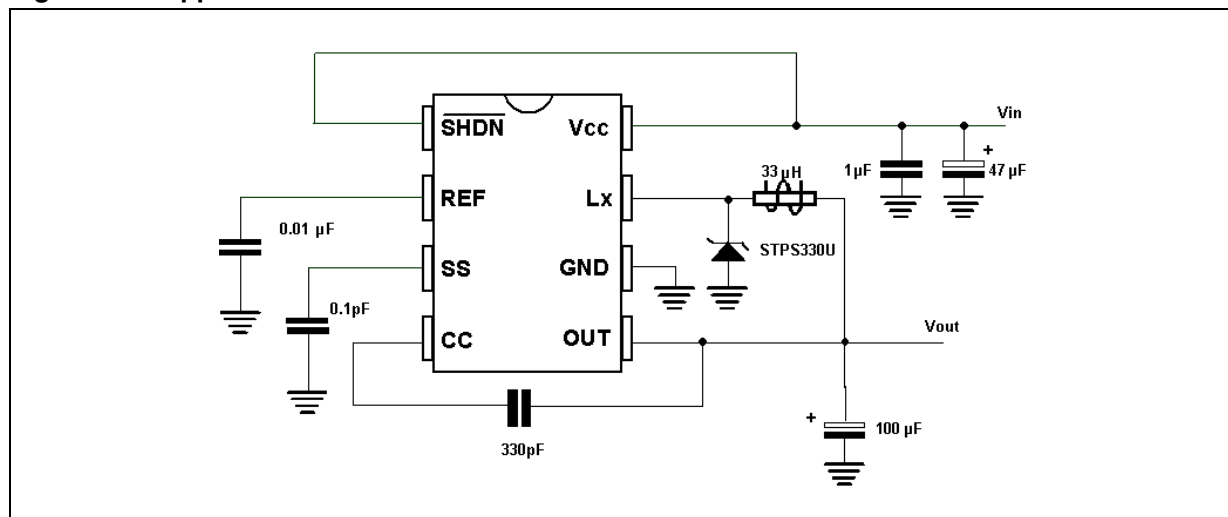
**Table 3. Thermal data**

| Symbol     | Parameter                                          | SO-8 | DIP-8 | Unit               |
|------------|----------------------------------------------------|------|-------|--------------------|
| $R_{thJA}$ | Thermal resistance junction-ambient <sup>(1)</sup> | 160  | 100   | $^\circ\text{C/W}$ |

1. This value depends from thermal design of PCB on which the device is mounted.

## 4 Typical application

Figure 3. Application circuit



## 5 Electrical characteristics

**Table 4. Electrical characteristics**

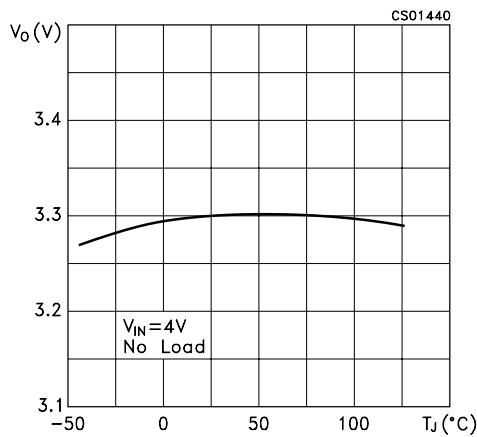
( $V_{CC}=5V$ ,  $I_O = 0mA$ ,  $T_A = T_{MIN}$  to  $T_{MAX}$ , unless otherwise specified).

| 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 $300mA$    | 3.135 | 3.3   | 3.465 | V               |
|                  |                                | $V_{CC} = 4.75$ to $11V$ , $I_O = 0$ to $500mA$ | 3.135 | 3.3   | 3.465 | V               |
| $\Delta V_O$     | Line regulation                |                                                 |       | 0.13  |       | %/V             |
| $\Delta V_O$     | Load regulation                | $I_O = 0$ to $500mA$                            |       | 0.005 |       | %/mA            |
| $\eta$           | Power efficiency               | $I_O = 300mA$                                   |       | 88    |       | %               |
|                  |                                | $I_O = 100mA$                                   |       | 90    |       |                 |
| $I_{SUPPLY}$     | Supply current                 | ON Mode (Including switch current)              |       | 0.6   | 2.5   | mA              |
|                  |                                | OFF Mode                                        |       | 0.2   | 100   | $\mu A$         |
| $V_{IH}$         | 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               |
| $\Delta V_{REF}$ | Temperature reference drift    | $T_A = T_{MIN}$ to $T_{MAX}$                    |       | 50    |       | ppm/ $^\circ C$ |
| $f_{OSC}$        | Switching frequency            | $T_A = 25^\circ C$                              | 159   | 200   | 212.5 | KHz             |
| $R_C$            | Compensation pin impedance     |                                                 |       | 7500  |       | $\Omega$        |

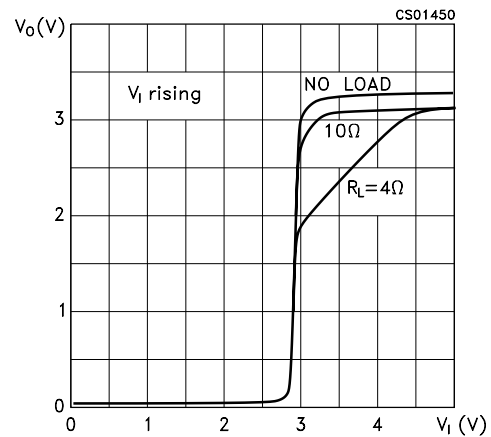
## 6 Typical performance characteristics

(Unless otherwise specified  $T_J = 25^\circ\text{C}$ )

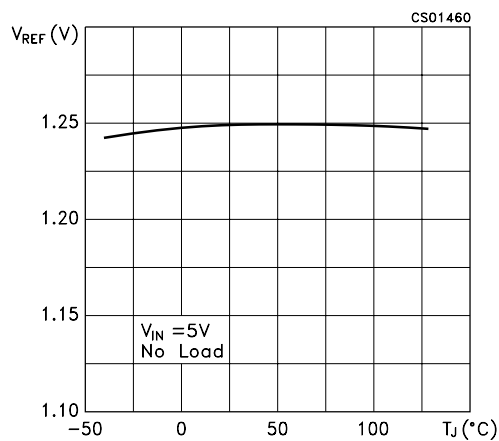
**Figure 4. Output voltage vs temperature**



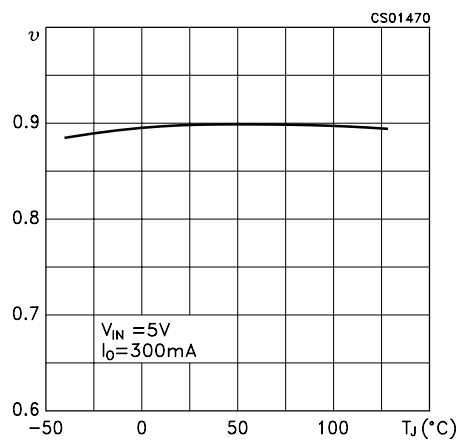
**Figure 5. Output voltage vs input voltage**



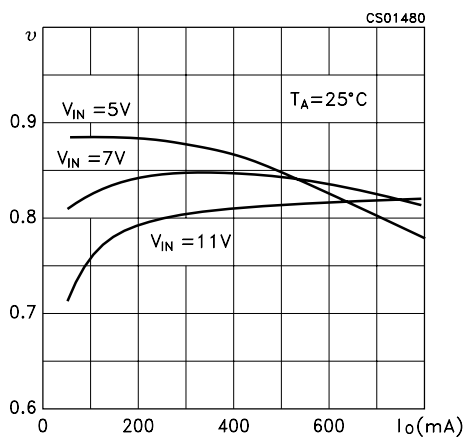
**Figure 6. Reference voltage vs temperature**



**Figure 7. Efficiency vs temperature**



**Figure 8. Efficiency vs output current**



**Figure 9. LX leakage current vs temperature**

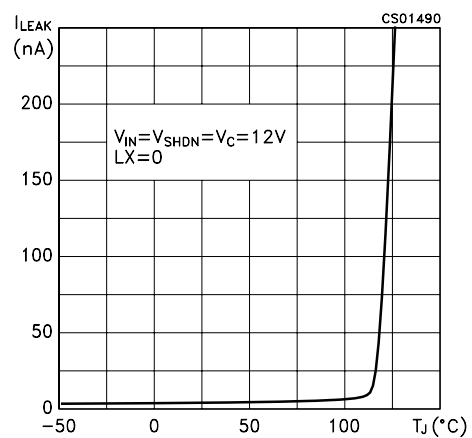


Figure 10. LX ON Resistance vs temperature

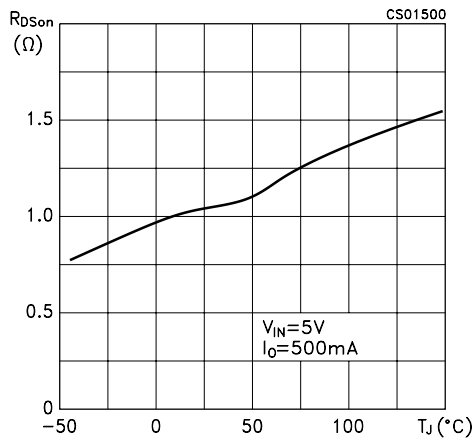


Figure 11. Shutdown input threshold vs temperature

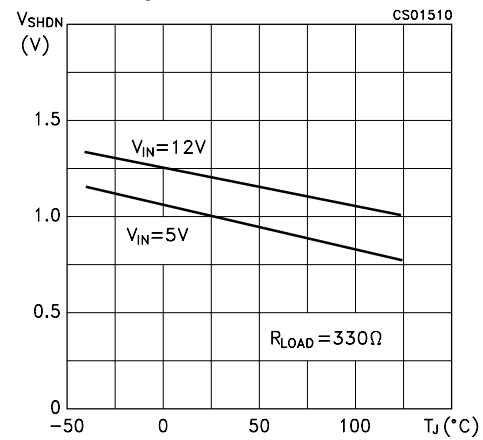


Figure 12. Shutdown input leakage current vs temperature

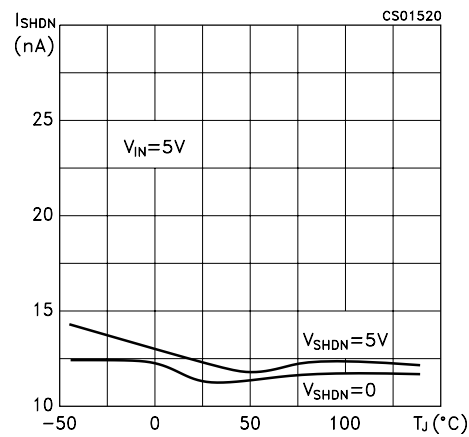


Figure 13. Oscillator frequency vs temperature

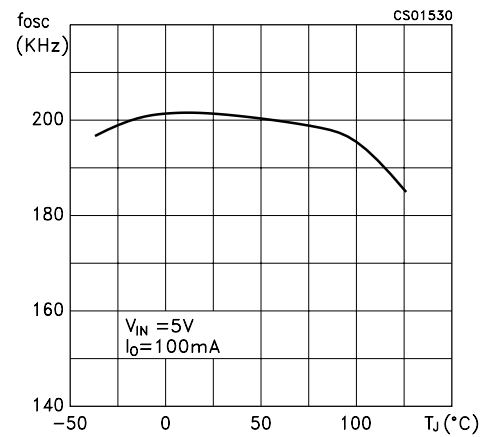


Figure 14. Oscillator frequency vs input voltage

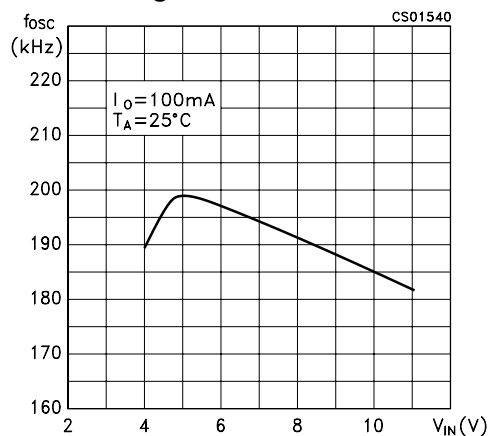
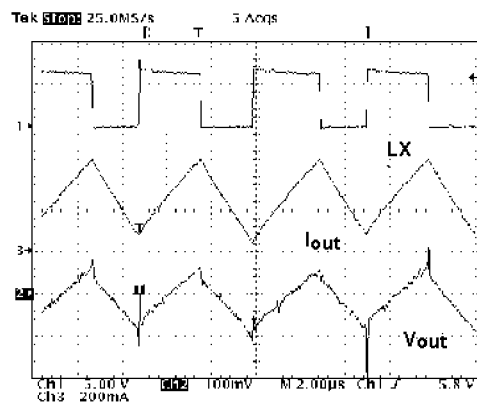
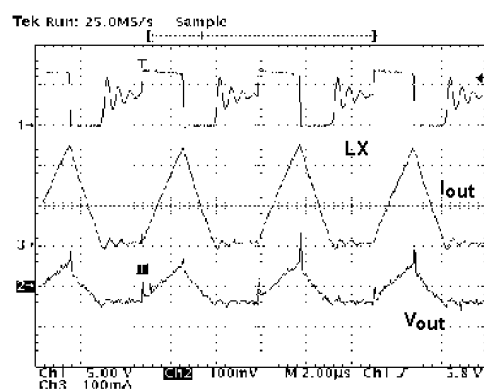
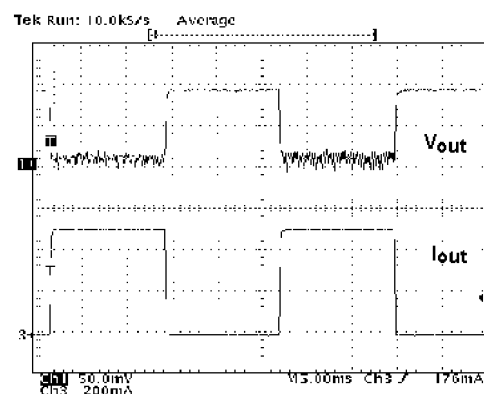


Figure 15. Switching waveform, continuous conduction

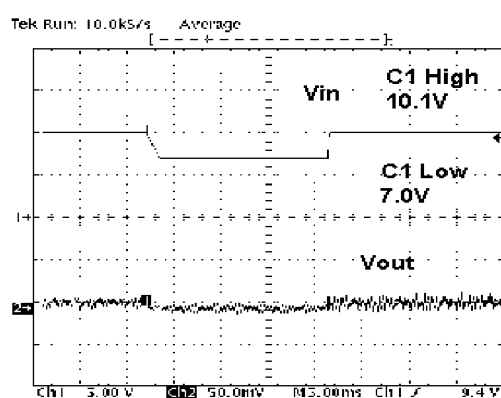


**Figure 16. Switching waveform, discontinuous conduction**

$V_I=6V$ ,  $I_O=75mA$

**Figure 17. Load transient**

$V_I=5V$ ,  $I_O=0$  to 500mA

**Figure 18. Line transient**

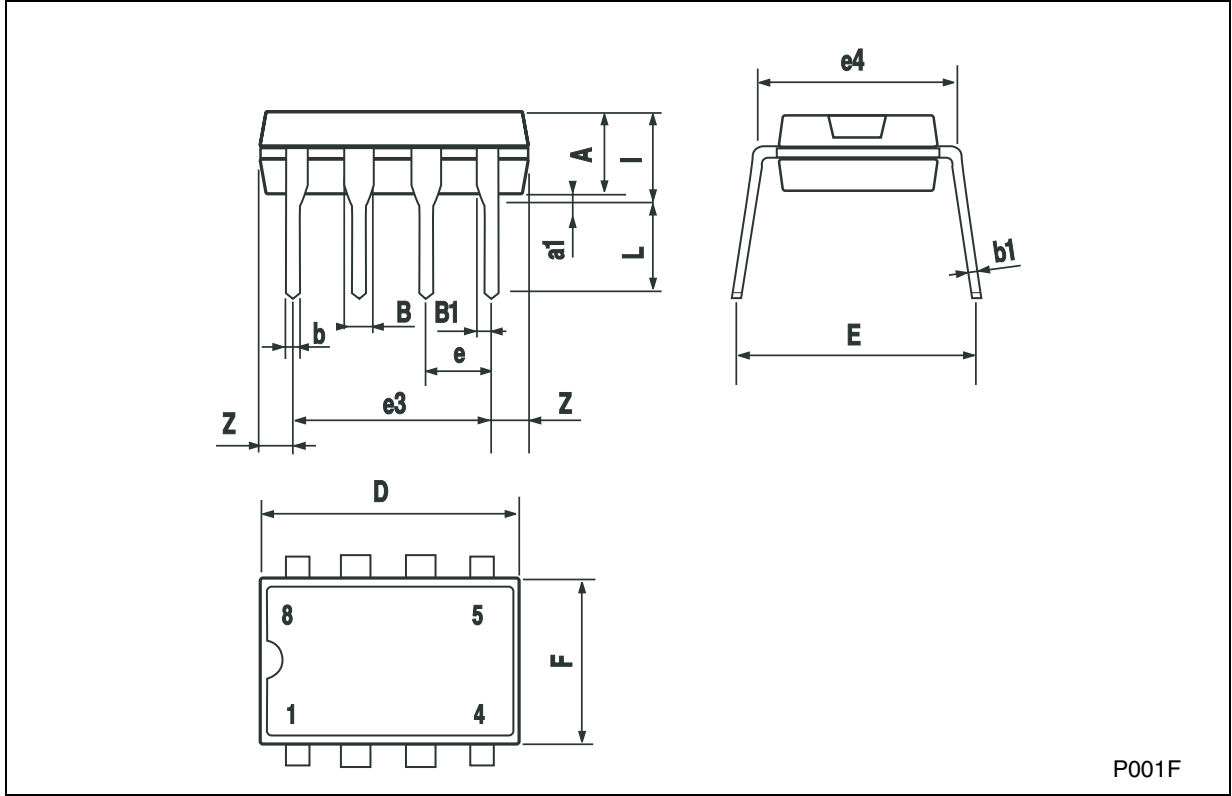
$I_O=350mA$

## 7 Package mechanical data

In order to meet environmental requirements, ST offers these devices in ECOPACK® packages. These packages have a Lead-free second level interconnect. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label. ECOPACK is an ST trademark. ECOPACK specifications are available at: [www.st.com](http://www.st.com).

Plastic DIP-8 MECHANICAL DATA

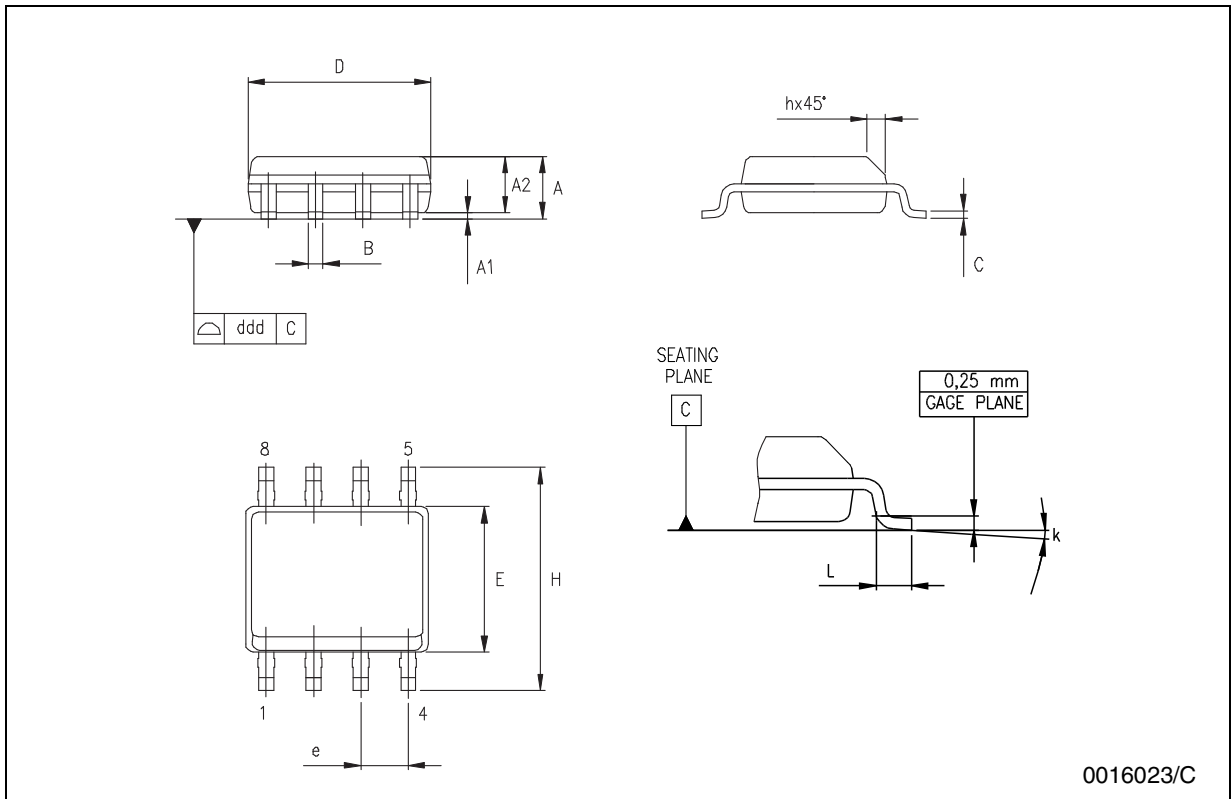
| DIM. | mm.  |      |      | inch  |       |       |
|------|------|------|------|-------|-------|-------|
|      | MIN. | TYP  | MAX. | MIN.  | TYP.  | MAX.  |
| A    |      | 3.3  |      |       | 0.130 |       |
| a1   | 0.7  |      |      | 0.028 |       |       |
| B    | 1.39 |      | 1.65 | 0.055 |       | 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

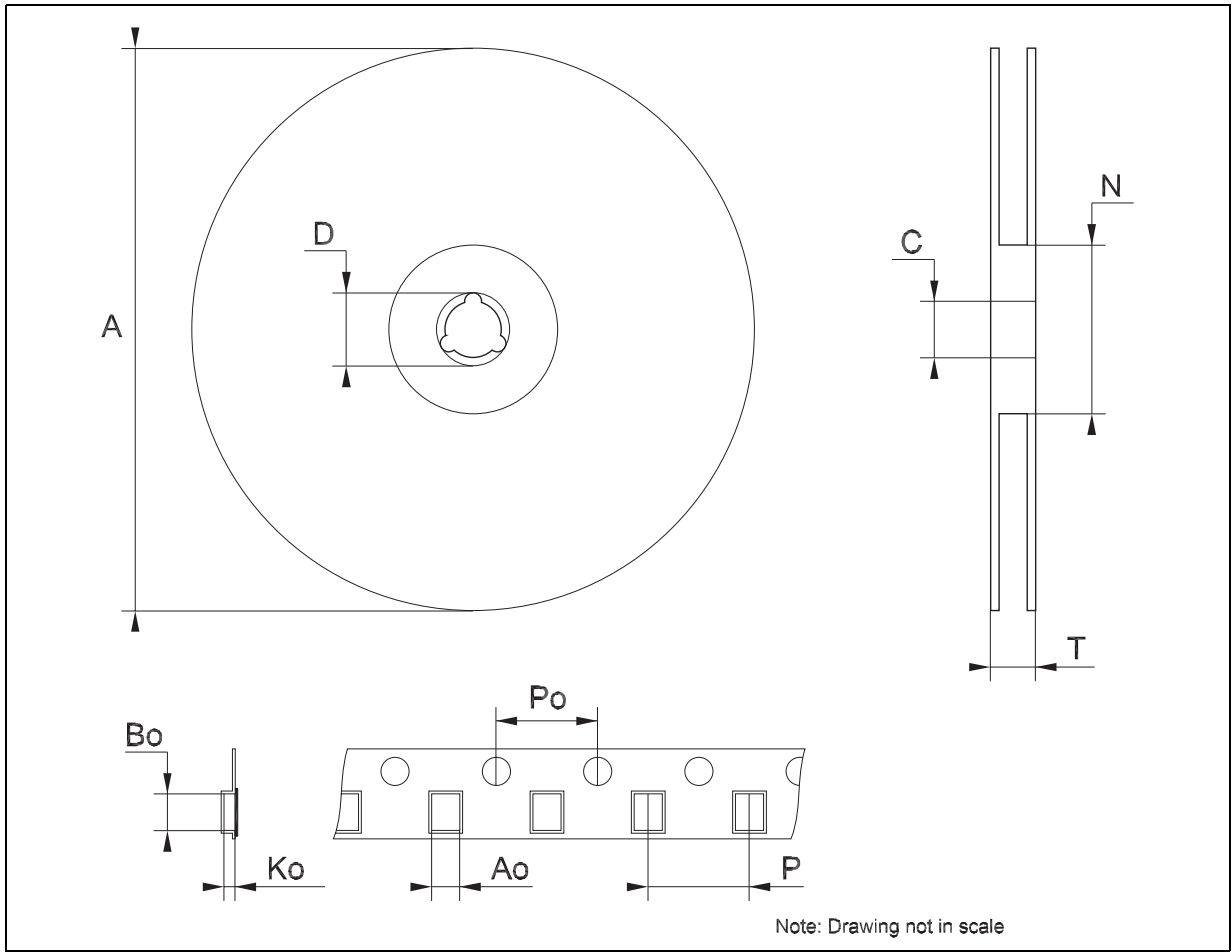
**SO-8 MECHANICAL DATA**

| 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  |



Tape & Reel SO-8 MECHANICAL DATA

| DIM. | mm.  |     |      | inch  |      |        |
|------|------|-----|------|-------|------|--------|
|      | MIN. | TYP | MAX. | MIN.  | TYP. | MAX.   |
| A    |      |     | 330  |       |      | 12.992 |
| C    | 12.8 |     | 13.2 | 0.504 |      | 0.519  |
| D    | 20.2 |     |      | 0.795 |      |        |
| N    | 60   |     |      | 2.362 |      |        |
| T    |      |     | 22.4 |       |      | 0.882  |
| Ao   | 8.1  |     | 8.5  | 0.319 |      | 0.335  |
| Bo   | 5.5  |     | 5.9  | 0.216 |      | 0.232  |
| Ko   | 2.1  |     | 2.3  | 0.082 |      | 0.090  |
| Po   | 3.9  |     | 4.1  | 0.153 |      | 0.161  |
| P    | 7.9  |     | 8.1  | 0.311 |      | 0.319  |



## 8 Revision history

Table 5. Revision history

| Date        | Revision | Changes                                                              |
|-------------|----------|----------------------------------------------------------------------|
| 26-May-2006 | 2        | Add T <sub>A</sub> row f <sub>OSC</sub> on table 4 and new template. |

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