

3.3V Step down current mode PWM DC-DC converters

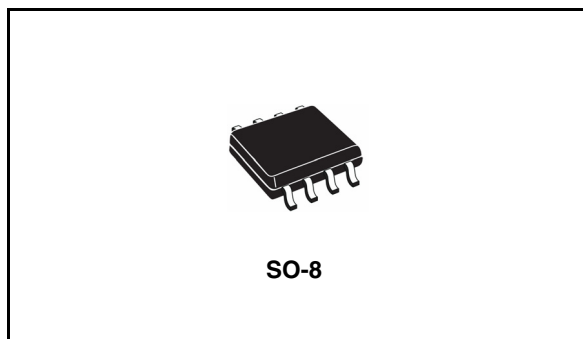
Features

- 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 package

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 ±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 is SO-8.

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

Order code

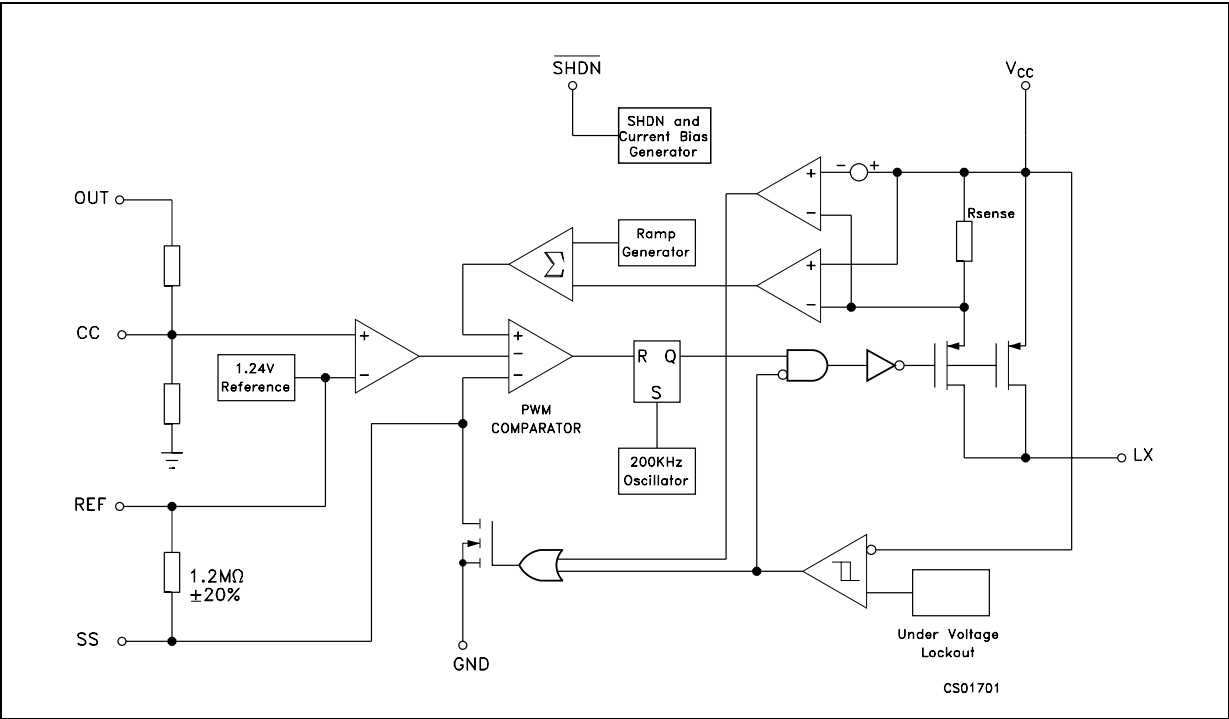
Part number	Packaging
ST763AC	ST763ACDTR

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1 Diagram

Figure 1. Schematic diagram



2 Pin configuration

Figure 2. Pin connections (top view)

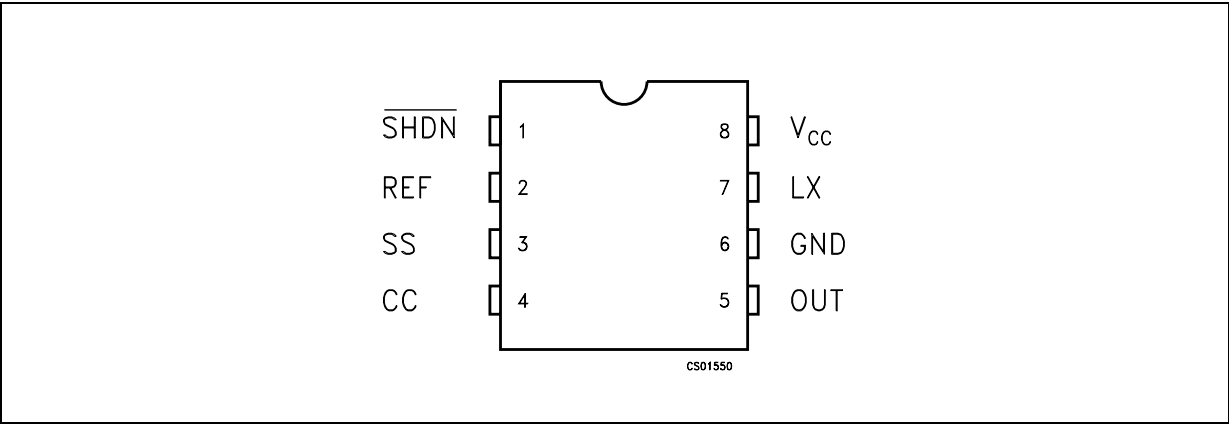


Table 1. Pin description

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 μ F ceramic capacitance and large value electrolytic capacitor in parallel. The 1 μ 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 $T_A = 70^\circ\text{C}$	SO-8	344	mW
T_{stg}	Storage temperature range		-40 to +150	$^\circ\text{C}$
T_{op}	Operating junction temperature range	AC series	0 to +70	$^\circ\text{C}$

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

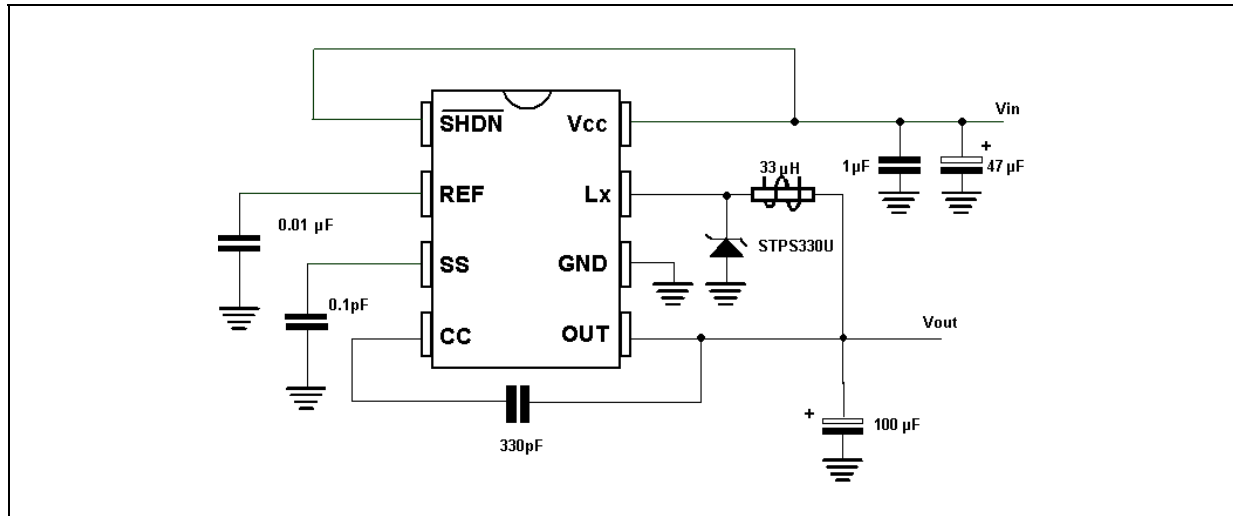
Table 3. Thermal data

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

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
ΔV_O	Line regulation			0.13		%/V
ΔV_O	Load regulation	$I_O = 0$ to $500mA$		0.005		%/mA
η	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	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	$I_{LX} = 500mA$		1		Ω
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
ΔV_{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		Ω

6 Typical performance characteristics

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

Figure 4. Output voltage vs temperature

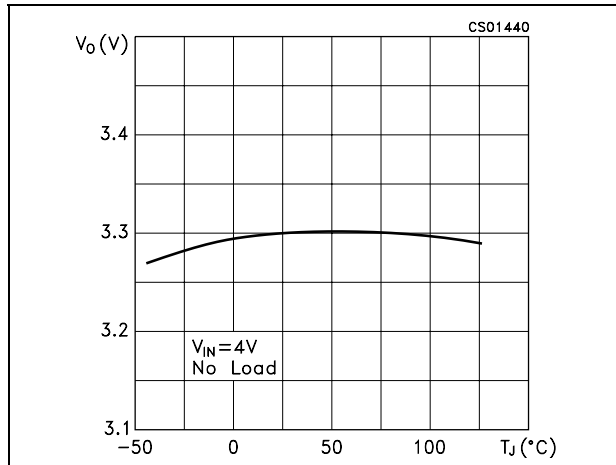


Figure 5. Output voltage vs input voltage

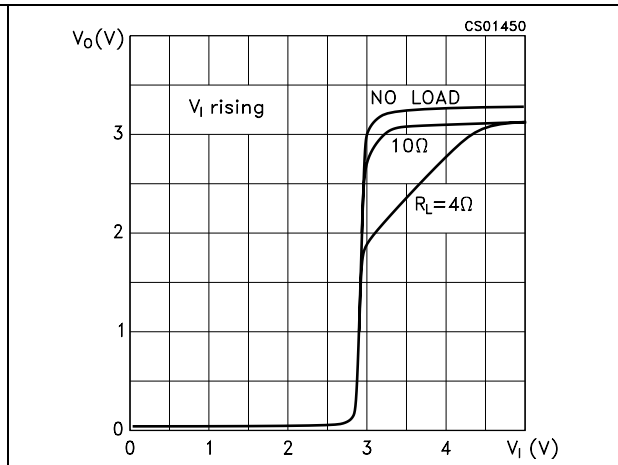


Figure 6. Reference voltage vs temperature

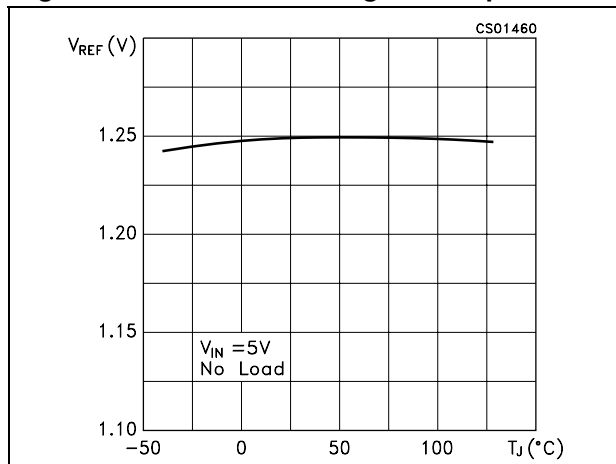


Figure 7. Efficiency vs temperature

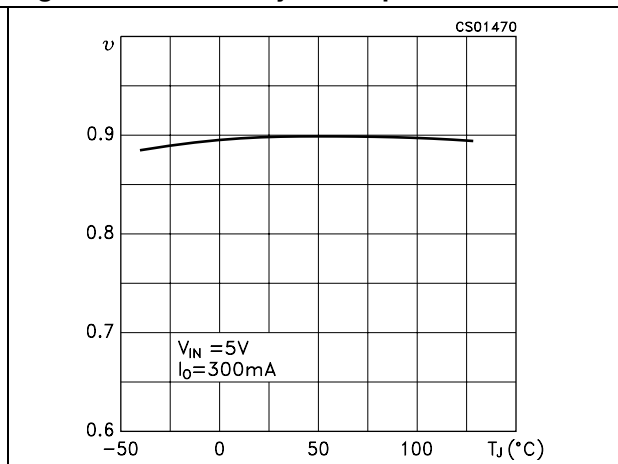


Figure 8. Efficiency vs output current

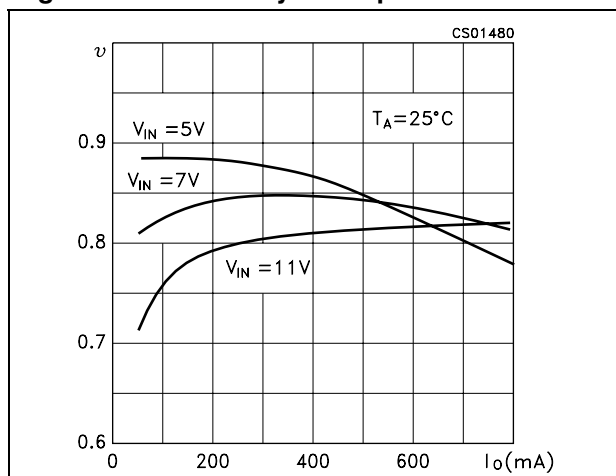


Figure 9. LX leakage current vs temperature

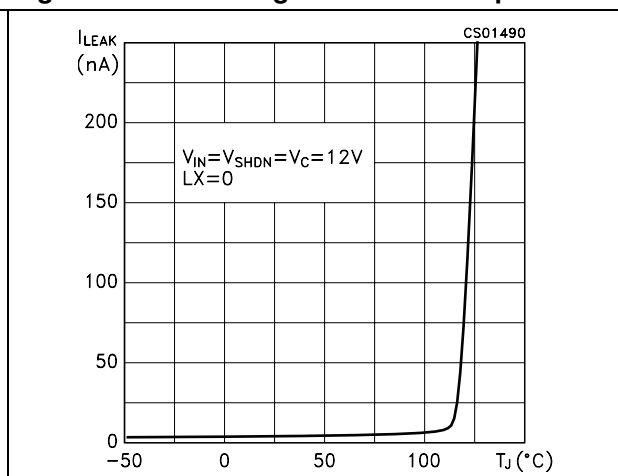


Figure 10. LX ON Resistance vs temperature

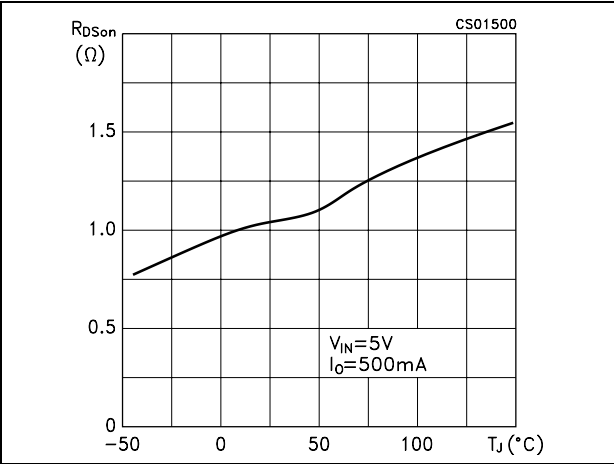


Figure 11. Shutdown input threshold vs temperature

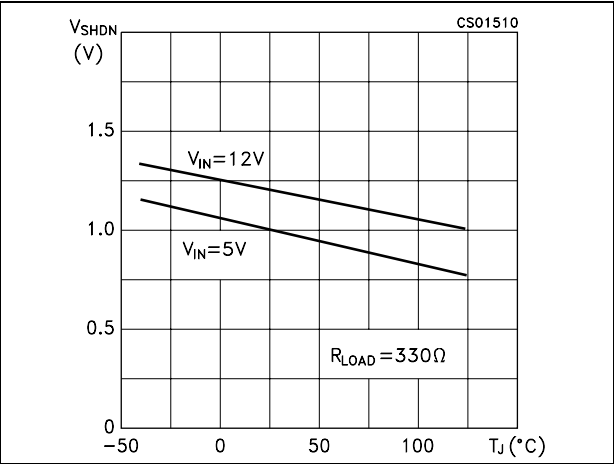


Figure 12. Shutdown input leakage current vs temperature

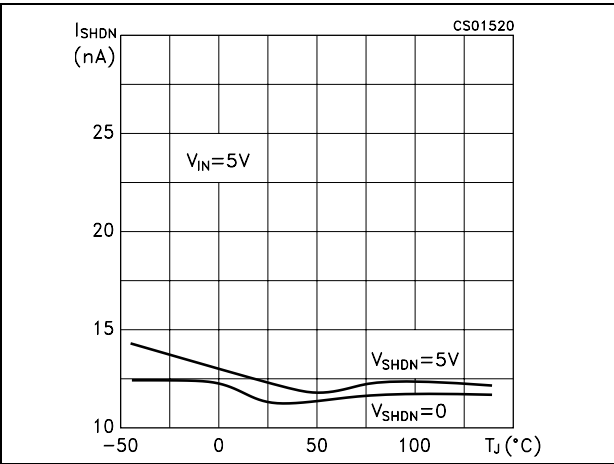


Figure 13. Oscillator frequency vs temperature

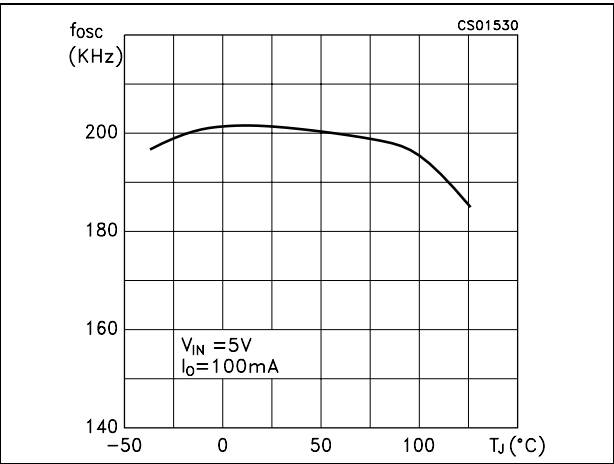


Figure 14. Oscillator frequency vs input voltage

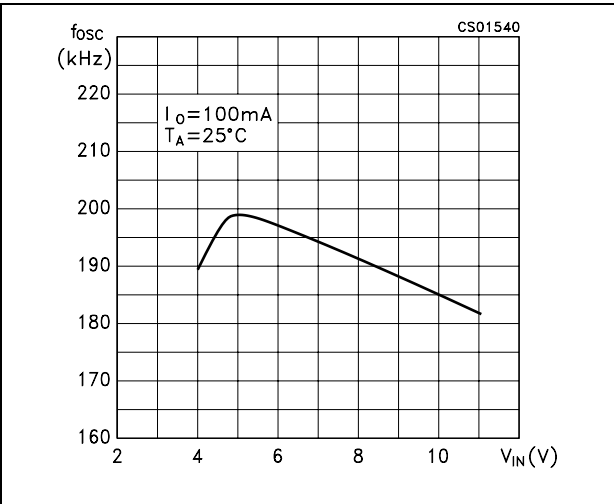
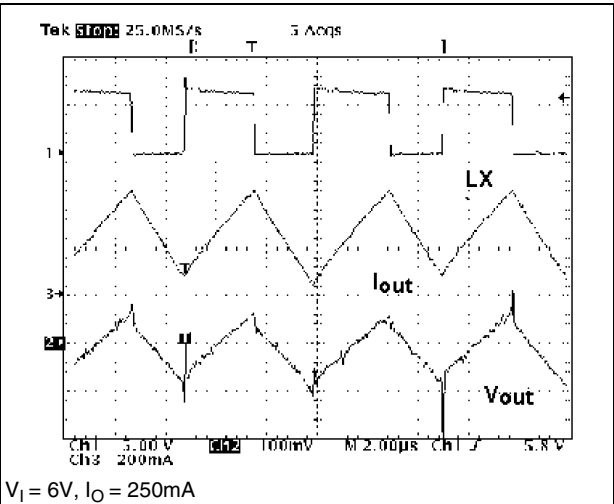


Figure 15. Switching waveform, continuous conduction

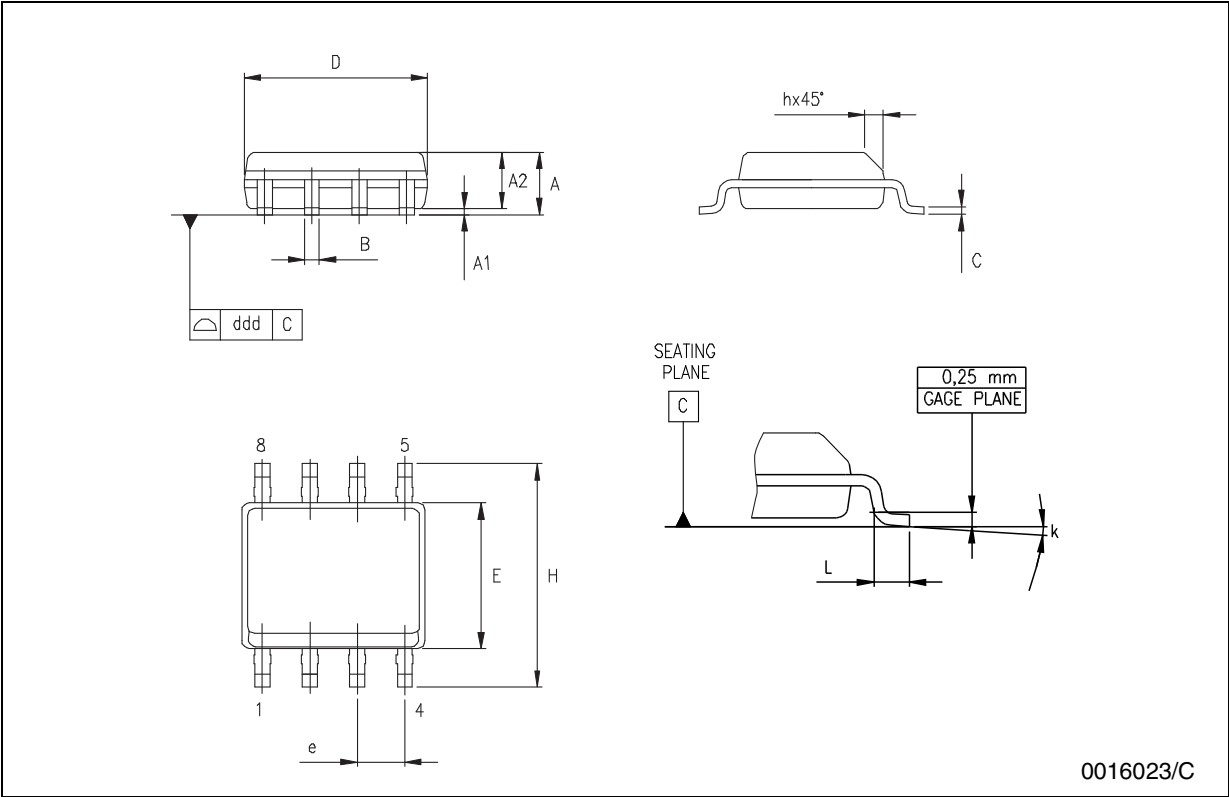


7 Package mechanical data

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.

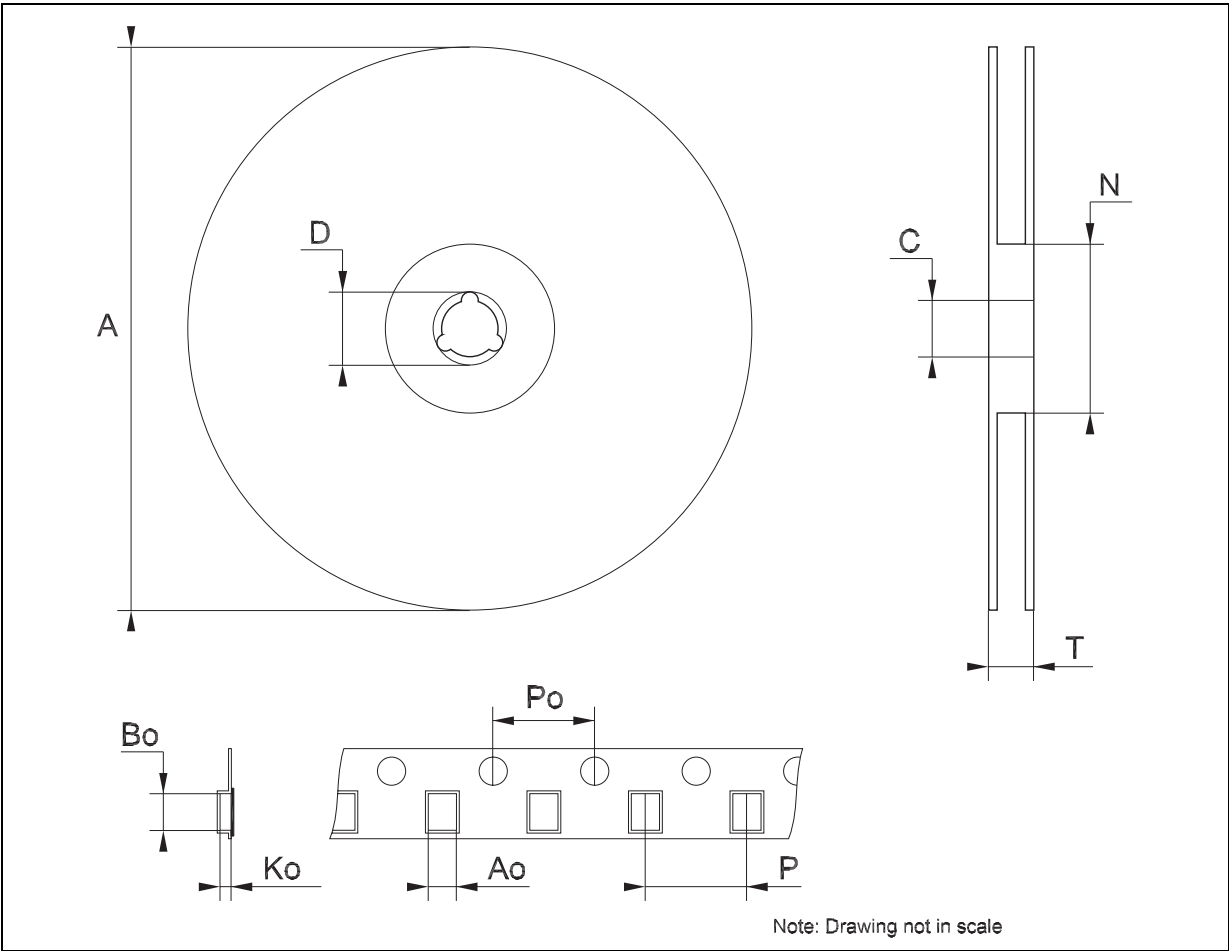
SO-8 MECHANICAL DATA

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_A row f_{OSC} on table 4 and new template.
29-May-2007	3	Order code has been updated.

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