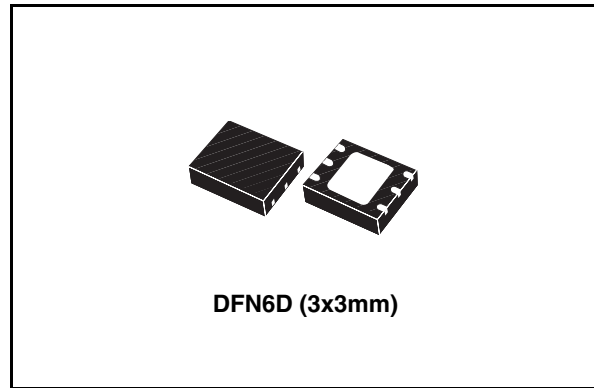


Features

- Step-down current mode PWM (1.5 MHz) DC-DC converter
- 2 % DC output voltage tolerance
- Internal soft start for START-UP current limitation and power on delay of 50-100 μ s
- Typical efficiency: > 70 % over all operating conditions
- 1.5 A output current capability
- Not switching quiescent current: max 2.5 mA over temperature range
- Switch V_{DS} : max 350 mV @ $I_{SW} = 750$ mA
- Uses tiny capacitors and inductors
- Available in DFN 3x3 mm exposed pad

Description

The ST1S03 is a step down DC-DC converter optimized for powering low-voltage digital core in HDD applications and, generally, to replace the high current linear solution when the power dissipation may cause an high heating of the application environment. It provides up to 1.5 A



over an input voltage range of 3 V to 16 V. An high switching frequency (1.5 MHz) allows the use of tiny surface-mount components: as well as the resistor divider to set the output voltage value, only an inductor, a schottky diode and two capacitors are required. Besides, a low output ripple is guaranteed by the current mode PWM topology and by the use of low ESR SMD ceramic capacitors. The device is thermal protected and current limited to prevent damages due to accidental short circuit. The ST1S03 is available in DFN6.

Table 1. Device summary

Order code	Packaging	Package
ST1S03PU	ST1S03PUR	DFN6D (3x3 mm)

3 Maximum ratings

Table 3. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V _{IN_SW}	Positive power supply voltage	-0.3 to 16	V
V _{IN_A}	Positive power supply voltage	-0.3 to 16	V
SWITCH voltage	Max voltage of output pin	-0.3 to 16	V
V _{FB}	Feedback voltage	2.5	V
I _{VFB}	Common mode input voltage	±1	mA
T _J	Max junction temperature	150	°C
T _{STG}	Storage temperature range	-25 to 150	°C
T _{LEAD}	Lead temperature (Soldering) 10 Sec.	300	°C

Note: Absolute maximum ratings are those values beyond which damage to the device may occur. Functional operation under these conditions is not implied.

Table 4. Thermal data

Symbol	Parameter	Value	Unit
R _{thJC}	Thermal resistance junction-case	10	°C/W
R _{thJA}	Thermal resistance junction-ambient	55	°C/W

4 Electrical characteristics

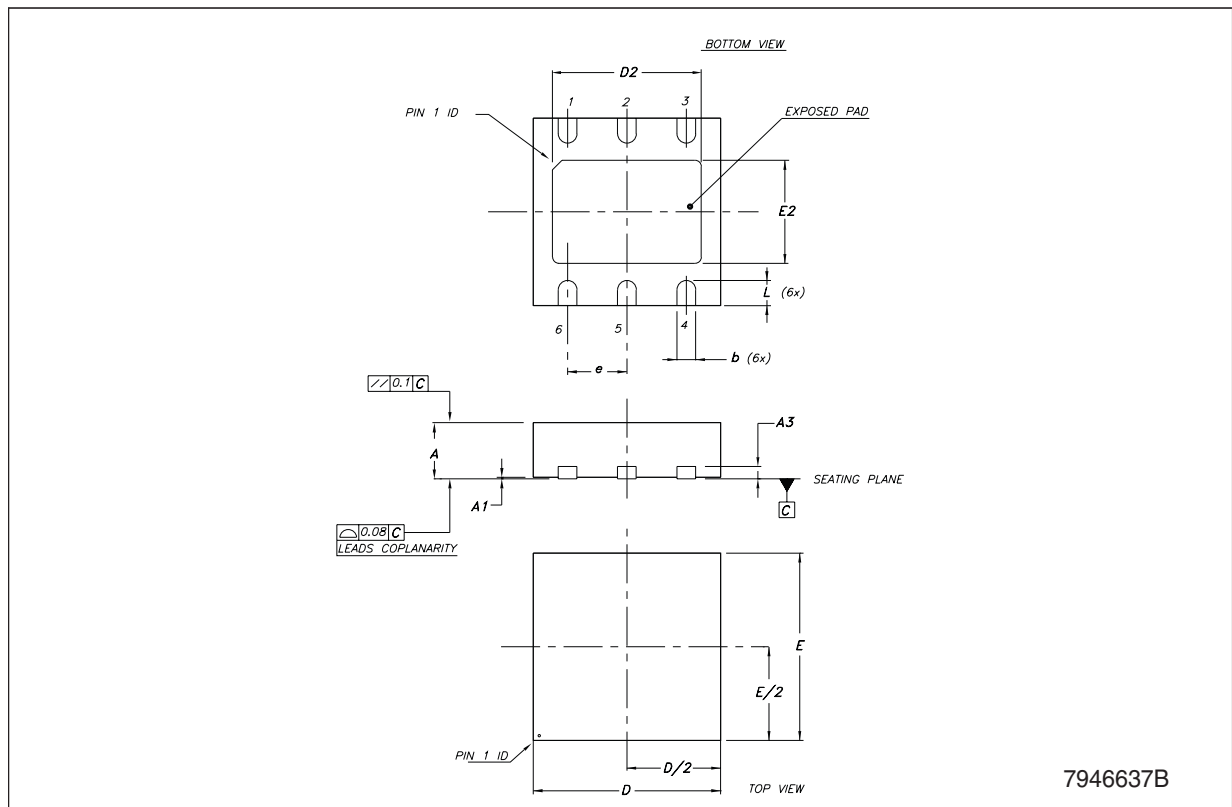
Table 5. Electrical characteristics ($V_{IN_SW} = V_{IN_A} = 5\text{ V}$, $C_1 = 4.7\ \mu\text{F}$, $C_O = 22\ \mu\text{F}$, $L_1 = 3.3\ \mu\text{H}$, $T_J = 0\text{ to }125\text{ }^\circ\text{C}$, unless otherwise specified. Typical values are referred to $25\text{ }^\circ\text{C}$)

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
FB	Feedback voltage	$I_O = 100\text{mA}$	784	800	816	mV
I_{FB}	V_{FB} pin bias current				600	nA
I_Q	Quiescent current	No Switching			2.5	mA
I_O	Output current	$V_{IN} = 3\text{V to }16\text{V}$	1.5			A
I_{MIN}	Minimum output current		1			mA
$\%V_O/\Delta V_{IN}$	Reference line regulation	$V_{IN} = 3\text{V to }16\text{V}$		0.032	0.06	$\%V_O/\Delta V_{IN}$
$\%V_O/\Delta I_O$	Reference load regulation	$I_O = 10\text{mA to }1.2\text{A}$		0.0014	0.003	$\%V_O/\text{mA}$
PWM f_S	PWM switching frequency ⁽¹⁾	$V_{FB} = 0.8\text{V}$, $T_A = 25^\circ\text{C}$	1.2	1.5	1.8	MHz
D_{MAX}	Maximum duty cycle			87		%
I_{SWL}	Switching current limitation		1.65			A
V_{DS}	Switch V_{DS}	$I_{SW} = 750\text{ mA}$		200	350	mV
E	Efficiency	$I_O = 10\text{mA to }1.2\text{A}$	70			%
T_{SHDN}	Thermal shut down ⁽¹⁾		130	150		$^\circ\text{C}$
T_{HYS}	Thermal shut down hysteresis ⁽¹⁾			15		$^\circ\text{C}$
$\Delta V_O/\Delta I_O$	Load transient response ⁽¹⁾	$I_O = 100\text{mA to }700\text{mA}$ $t_R = t_F \geq 100\text{ns}$, $T_A = 25^\circ\text{C}$	-5		+5	$\%V_O$
$\Delta V_O/\Delta I_O @ I_O=\text{short}$	Short circuit removal response ⁽¹⁾	$I_O = 10\text{mA to short}$, $T_A = 25^\circ\text{C}$			+5	$\%V_O$

1. Guaranteed by design, but not tested in production.

DFN6D (3x3 mm) mechanical data

Dim.	mm.			inch.		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	0.80		1.00	0.031		0.039
A1	0	0.02	0.05	0	0.001	0.002
A3		0.20			0.008	
b	0.23		0.45	0.009		0.018
D	2.90	3.00	3.10	0.114	0.118	0.122
D2	2.23		2.50	0.088		0.098
E	2.90	3.00	3.10	0.114	0.118	0.122
E2	1.50		1.75	0.059		0.069
e		0.95			0.037	
L	0.30	0.40	0.50	0.012	0.016	0.020



Tape & Reel QFNxx/DFNxx (3x3) 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			18.4			0.724
Ao		3.3			0.130	
Bo		3.3			0.130	
Ko		1.1			0.043	
Po		4			0.157	
P		8			0.315	

