



L6925D

HIGH EFFICIENCY MONOLITHIC SYNCHRONOUS STEP DOWN REGULATOR

1 FEATURES

- 2.7V TO 5.5V BATTERY INPUT RANGE
- HIGH EFFICIENCY: UP TO 95%
- INTERNAL SYNCHRONOUS SWITCH
- NO EXTERNAL SCHOTTKY REQUIRED
- EXTREMELY LOW QUIESCENT CURRENT
- 800mA MAX OUTPUT CURRENT
- ADJUSTABLE OUTPUT VOLTAGE FROM 0.6V
- LOW DROP-OUT OPERATION: UP TO 100% DUTY CYCLE
- SELECTABLE LOW NOISE/LOW CONSUMPTION MODE AT LIGHT LOAD
- LOW BATTERY INPUT
- LOW BATTERY OUTPUT
- $\pm 1\%$ OUTPUT VOLTAGE ACCURACY
- CURRENT-MODE CONTROL
- 600kHz SWITCHING FREQUENCY
- EXTERNALLY SYNCHRONIZABLE FROM 500kHz TO 1.4MHz
- OVP
- SHORT CIRCUIT PROTECTION

1.1 APPLICATIONS

- BATTERY-POWERED EQUIPMENTS
- PORTABLE INSTRUMENTS
- CELLULAR PHONES
- PDAs AND HAND HELD TERMINALS
- DSC
- GPS

Figure 1. Package

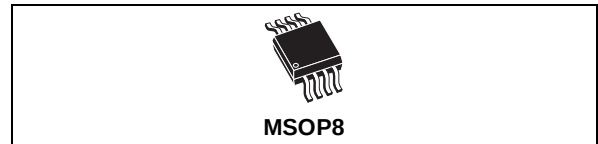


Table 1. Order Codes

Part Number	Package
L6925D	MSOP8 (Tube)
L6925D013TR	Tape & Reel

2 DESCRIPTION

The device is dc-dc monolithic regulator specifically designed to provide extremely high efficiency.

The device has on UVLO set at 2.7V cause it is particularly thought for single Li-ion cell applications. Output voltage can be selected by an external divider down to 0.6V. Duty Cycle can saturate to 100% allowing low drop-out operation.

The device is based on a 600kHz fixed-frequency, current mode-architecture. Low Consumption Mode operation can be selected at light load conditions, allowing switching losses to be reduced. L6925D is externally synchronizable with a clock which makes it useful in noise-sensitive applications.

LBI pin can be used to have a $\overline{\text{LBO}}$ signal when the Battery voltage is lower than a preset value. Other features like, Overvoltage protection, Shortcircuit protection and Thermal Shutdown (150°C) are also present.

Figure 2. Application Test Circuit

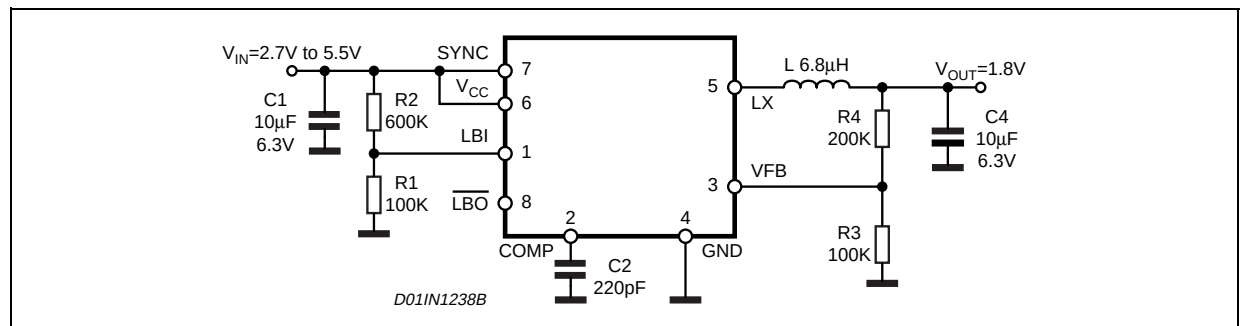
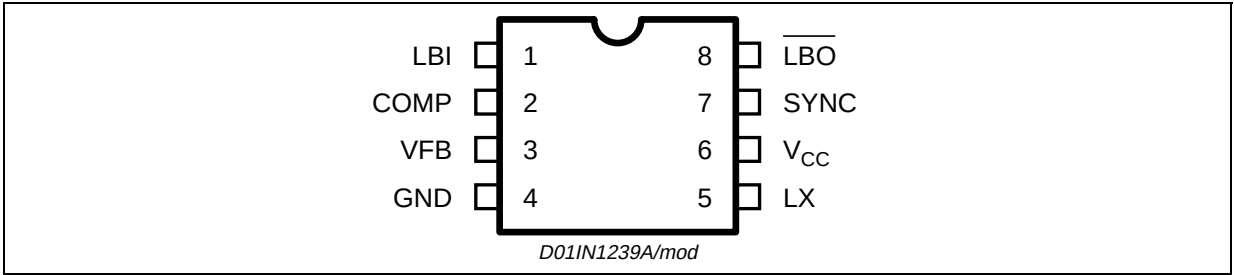


Table 2. Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V ₆	Input voltage	-0.3 to 6	V
V ₅	Output switching voltage	-1 to V _{CC}	V
V ₁ , V ₈	Low Battery Input, Low Battery Output	-0.3 to V _{CC}	V
V ₃	Feedback voltage	-0.3 to V _{CC}	V
V ₂	Error Amplifier Output Voltage	-0.3 to V _{CC}	V
V ₇	Synchronization / Mode Selector	-0.3 to V _{CC}	V
P _{tot}	Power dissipation at Tamb=70°C	0.45	W
T _j	Junction operating temperature range	-40 to 150	°C
T _{stg}	Storage temperature range	-65 to 150	°C
LX Pin	Maximum Withstanding Voltage Range Test Condition: CDF-AEC-Q100-002- "Human Body Model" Acceptance Criteria: "Normal Performance"	±1000	V
Other pins		±2000	V

Figure 3. Pin Connection**Table 3. Thermal Data**

Symbol	Parameter	Value	Unit
R _{th j-amb}	Thermal Resistance Junction to Ambient	180	°C/W

Table 4. Pin Functions

N	Name	Description
1	LBI	Battery low voltage detector input. The internal threshold is set to 0.6V. The external threshold can be adjusted by using an external resistor divider.
2	COMP	Error amplifier output. Compensate it with a 220pF capacitor
3	VFB	Error amplifier input. The output voltage can be adjusted by using an external resistor divider connected to this pin (V _{FB} = 0.6V).
4	GND	Ground.
5	LX	Switch node connection to the inductor.
6	VCC	Input voltage.
7	SYNC	This pin allows to select Low Noise/ Low Consumption Mode or to synchronize the device.
8	LBO	Battery low voltage detector output. If the voltage at the LBI pin drops below the internal threshold, LBO goes low. The LBO is an open drain output. A pull_up resistor should be connected between the pin and the output voltage

Table 5. ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, $V_{CC} = 3.6\text{V}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
V _{CC}	Operating input voltage	After Turn On	2.7		5.5	V
V _{CC ON}	Turn On threshold			2.8		V
V _{CC OFF}	Turn Off threshold			2.65		V
V _{CC hys}	Hysteresis			150		mV
R _p	High side Ron	V _{CC} = 3.6V, I _{LX} =100mA		240		mΩ
R _n	Low side Ron	V _{CC} = 3.6V, I _{LX} =100mA		215		mΩ
I _{lim}	Peak current limit	V _{CC} = 3.6V		1.2		A
	Valley current limit	V _{CC} = 3.6V		1.4		A
V _{out}	Output voltage range		0.6		V _{CC}	V
f _{osc}	Oscillator frequency			600		KHz
f _{sync}	Sync mode clock (*)		500		1400	KHz
DC CHARACTERISTICS						
I _q	Quiescent current (low noise mode)	V _{sync} = 0V, no load, V _{FB} > 0.6V		230		μA
	Quiescent current (low consumption mode)	V _{sync} = V _{CC} , no load, V _{FB} > 0.6V		25		μA
I _{sh}	Shutdown current	V _{CC} < 2.7V, V _{FB} > 0.6V		0.2		μA
I _{LX}	LX leakage current (*)	V _{CC} < 2.7V, V _{LX} = V _{CC}		1		μA
		V _{CC} < 2.7V, V _{LX} = 0V		1		μA
ERROR AMPLIFIER CHARACTERISTICS						
V _{fb}	Voltage feedback		0.593	0.6	0.607	V
I _{fb}	Feedback input current (*)	V _{FB} = 0.6V		25		nA
SYNC/MODE FUNCTION						
V _{sync_H}	Sync mode threshold high				1.3	V
V _{sync_L}	Sync mode threshold low		0.5			V
LB SECTION						
V _{LBI}	LBI Threshold			0.6		V
V _{LBO}	$\overline{\text{LBO}}$ Logic Low	I _{sink} = 1mA, V _{CC} = 3.6V, V _{LBI} < 0.6V		0.2	0.4	V
I _{LK-LBO}	$\overline{\text{LBO}}$ Leakage Current (*)	V _{LBO} = 3.6V, V _{CC} = 3.6V, V _{LBI} > 0.6V			50	nA
PROTECTIONS						
HOVP	Hard overvoltage threshold			10		%Vout

(*) Guaranteed by design

Figure 4. MSOP8 Mechanical Data & Package Dimensions

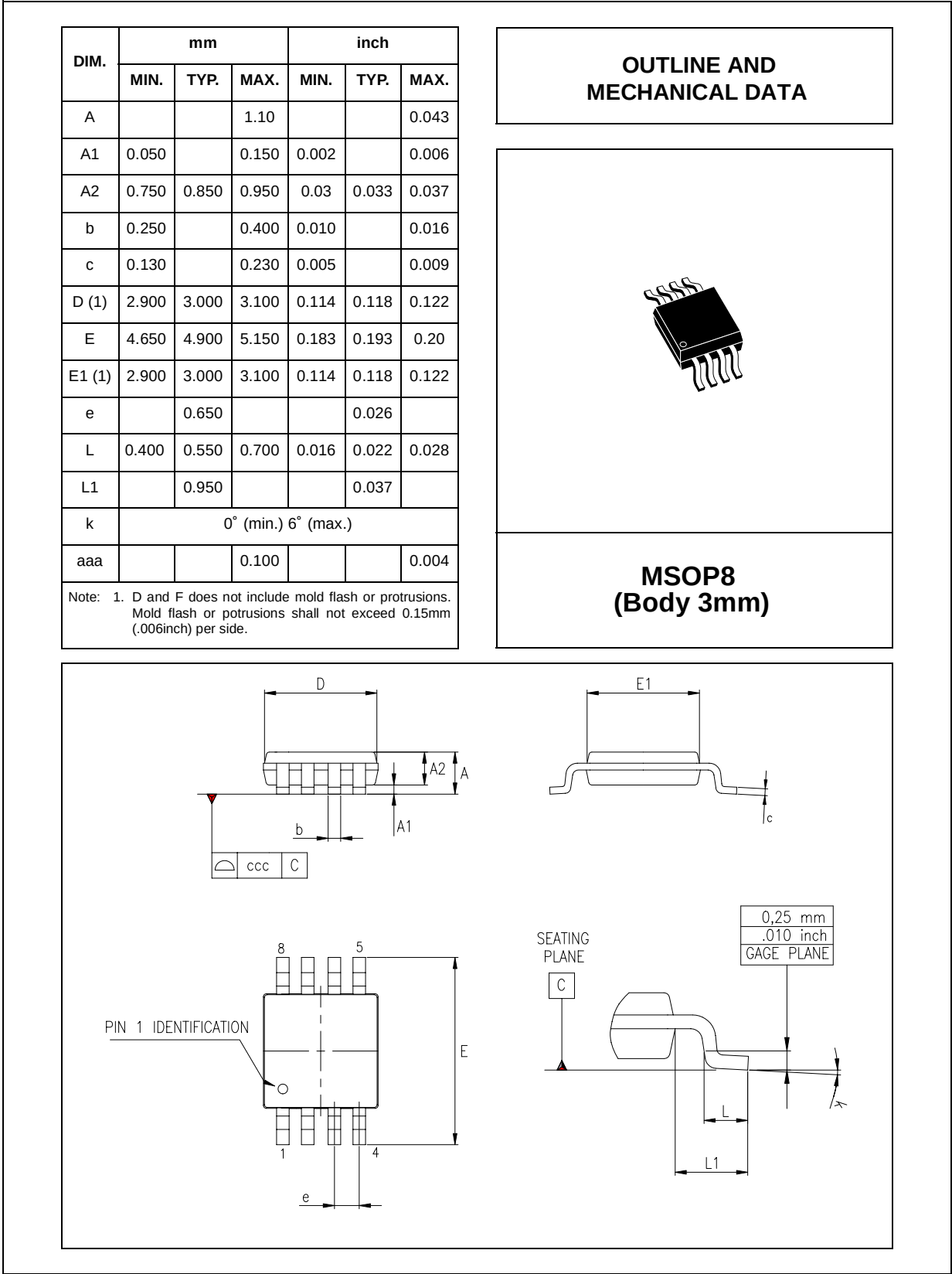


Table 6. Revision History

Date	Revision	Description of Changes
January 2004	2	First Issue in EDOCS DMS
September 2004	3	Changed Style-sheet and Table 2

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