

HIGH EFFICIENCY MONOLITHIC SYNCHRONOUS STEP DOWN REGULATOR

Figure 1. Package

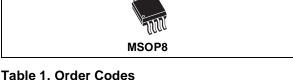
FEATURES

- 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 TO100% **DUTY CYCLE**
- SELECTABLE LOW NOISE/LOW CONSUMPTION MODE AT LIGHT LOAD
- LOW BATTERY INPUT
- LOW BATTERY OUTPUT
- ±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 2. Application Test Circuit



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

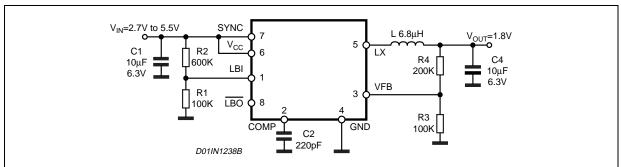
DESCRIPTION 2

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 particurarly 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 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.



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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	Syncronization / Mode Selector	-0.3 to V _{CC}	V
P _{tot}	Power dissipation at Tamb=70°C	0.45	W
Tj	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-	±1000	V
Other pins	AEC-Q100-002- "Human Body Model" Acceptance Criteria: "Normal Performance"	±2000	V

Figure 3. Pin Connection

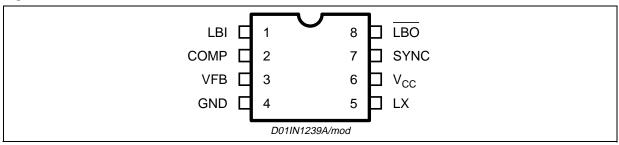


Table 3. Thermal Data

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

Table 4. Pin Functions

2/6

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 sychronize the device.				
8	LBO	Battery low voltage detector output. If the voltage at the LBI pin drops below the internal thrshold, LBO goes low. The LBO is an open drain output. A pull_up resistor should be connected between the pin and the output voltage				

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

Symbol	Parameter	Test Condition	Min	Тур	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
Rp	High side Ron	$V_{CC} = 3.6V, I_{IX} = 100mA$		240		mΩ
R _n	Low side Ron	$V_{CC} = 3.6V, I_{IX} = 100mA$		215		mΩ
I _{lim}	Peak current limit	V _{cc} = 3.6V		1.2		Α
	Valley current limit	V _{CC} = 3.6V		1.4		Α
V _{out}	Output voltage range		0.6		Vcc	V
f _{osc}	Oscillator frequency			600		KHz
f _{sync}	Sync mode clock (*)		500		1400	KHz
DC CHARA	CTERISTICS					
Iq	Quiescent current (low noise mode)	V _{sync} = 0V, no load, V _{FB} > 0.6V		230		μΑ
	Quiescent current (low cunsumption mode)	V _{sync} = V _{cc} , no load, V _{FB} > 0.6V		25		μΑ
I _{sh}	Shutdown current	V _{cc} < 2.7V, V _{FB} > 0.6V		0.2		μΑ
I _{lx}	LX leakage current (*)	V_{CC} < 2.7V, V_{LX} = V_{CC}		1		μΑ
		V_{CC} < 2.7V, V_{LX} = 0V		1		μΑ
ERROR AM	PLIFIER CHARACTERISTICS				·	
V _{fb}	Voltage feedback		0.593	0.6	0.607	V
I _{fb}	Feedback input current (*)	V _{FB} = 0.6V		25		nA
SYNC/MOD	E FUNCTION	-		I		
V _{sync_H}	Sync mode threshold high				1.3	V
V _{sync_L}	Sync mode threshold low		0.5			V
LB SECTIO	N	,	1	l .		
V_{LBI}	LBI Threshold			0.6		V
V _{LBO}	LBO Logic Low	$I_{Sink} = 1 \text{mA}, \ V_{CC} = 3.6 \text{V}, \\ V_{LBI} < 0.6 \text{V}$		0.2	0.4	V
I _{LK-LBO}	LBO Leakage Current (*)	$V_{\overline{LBO}} = 3.6V, V_{CC} = 3.6V, V_{LBI} > 0.6V$			50	nA
PROTECTIO	ONS		1		1	
HOVP	Hard overvoltage threshold			10		%Vout

^(*) Guaranteed by design



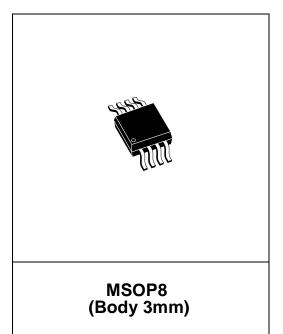
Figure 4. MSOP8 Mechanical Data & Package Dimensions

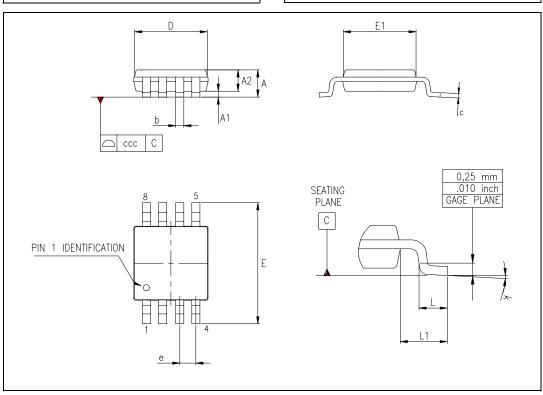
	mm			inch		
DIM.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
А			1.10			0.043
A1	0.050		0.150	0.002		0.006
A2	0.750	0.850	0.950	0.03	0.033	0.037
b	0.250		0.400	0.010		0.016
С	0.130		0.230	0.005		0.009
D (1)	2.900	3.000	3.100	0.114	0.118	0.122
Е	4.650	4.900	5.150	0.183	0.193	0.20
E1 (1)	2.900	3.000	3.100	0.114	0.118	0.122
е		0.650			0.026	
L	0.400	0.550	0.700	0.016	0.022	0.028
L1		0.950			0.037	
k	0° (min.) 6° (max.)					
aaa			0.100			0.004

Note: 1. D and F does not include mold flash or protrusions.

Mold flash or potrusions shall not exceed 0.15mm
(.006inch) per side.

OUTLINE AND MECHANICAL DATA





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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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