

Synchronous Buck Converter with Low-Noise LDO Regulator

Features

Buck Converter

- High Efficiency: Up to 95%
- Low Quiescent Current: Only 50µA During Operation
- Internal Soft Start Function
- 600mA Output Current
- 2.5V to 6V Input Voltage Range
- 1.2MHz Switching Frequency
- No Schottky Diode Required
- 100% Duty Cycle in Dropout Operation
- 0.6V Reference Allows Low Output Voltages
- <1µA Shutdown Current
- Current Mode Operation for Excellent Line and Load Transient Response

LDO Regulator

- Ultra Low Output Noise 30µV (rms)
- Ultra Low 55µA No-Load Supply Current
- Ultra Low Dropout 70mV @ 50mA Load
- Guarantee 300mA Output Current
- Fixed Mode: 3V
- Max. Supply Current in Shutdown Mode < 1µA
- Stable with Low Cost Ceramic Capacitors
- Over Temperature Protected
- RoHS Compliant

Applications

- Digital Still and Video Cameras
- MP3 Players
- Portable Instruments

General Description

The G5723 consists of a synchronous step-down DC/DC converter and a low-noise LDO regulator. The DC/DC converter is operated on current mode architecture. Switching frequency is set at 1.2MHz allowing the use of small surface mount inductor and capacitor. The internal synchronous switches increase efficiency and eliminate the need for external Schottky diode. It is ideal for system powered by a 1-cell Li-ion battery.

Ordering Information

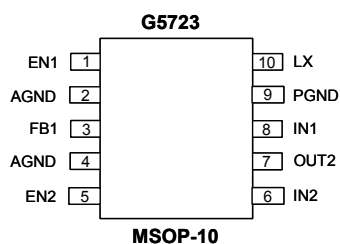
ORDER NUMBER	MARKING	VOLTAGE	TEMP. RANGE	PACKAGE (Pb free)
G5723-30P71U	G5723E	3.0V	-40°C to +85°C	MSOP-10
G5723-33P71U	G5723F	3.3V	-40°C to +85°C	MSOP-10

Note: P7: MSOP-10

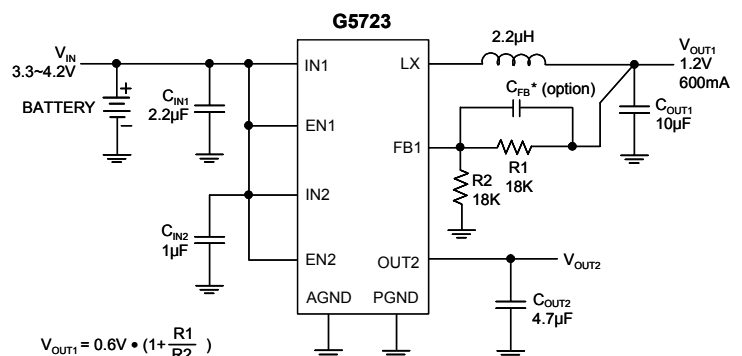
1: Bonding Code

U: Tape & Reel

Pin Configuration



Typical Application Circuit



**Absolute Maximum Ratings**

IN1, IN2 to GND -0.3V to +7V
 EN1, EN2 to GND -0.3V to IN+0.3V
 LX to GND -1V to IN+1V
 LDO Short Circuit Duration Infinite
 P-Channel Switch Source Current (DC) 1A
 N-Channel Switch Sink Current (DC) 1A

Peak LX Sink and Source Current 1.3A
 Operating Temperature Range -40°C to 85°C
 Maximum Junction Temperature 150°C
 Storage Temperature Range -65°C to 165°C
 Reflow Temperature (soldeing, 10 sec) 260°C

Electrical Characteristics(T_A=25°C, V_{IN}=3.6V, unless otherwise specified.)**Buck Converter**

PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
Feedback Current		-30	0	+30	nA
Regulated Feedback Voltage		0.588	0.6	0.612	V
Reference Voltage Line Regulation	V _{IN} = 2.5V to 5.5V	---	0.1	---	%/V
Peak Inductor Current	V _{IN} = 5V, V _{OUT1} = 3V	---	1	---	A
Output Voltage Load Regulation		---	0.5	---	%
Input Voltage Range		2.5	---	6	V
Quiescent Current	Active Mode (no switching)	---	50	150	μA
	Shutdown Mode	---	0	1	
Oscillator Frequency		---	1.2	---	MHz
R _{DS(ON)} of P-Channel FET	I _{LX} = 100mA	---	0.3	0.5	Ω
R _{DS(ON)} of N-Channel FET	I _{LX} = 100mA	---	0.3	0.5	Ω
LX Leakage Current	V _{EN1} = 0V, V _{LX} = 5V, V _{IN} = 5V	---	---	1	μA
EN Threshold		---	1	---	V
EN Leakage Current		---	0	1	μA
Maximum Duty Cycle		100	---	---	%
Minimum On Time		---	---	0	ns

Electrical Characteristics

($V_{IN}=V_{OUT2}+1V$, $V_{EN2}=V_{IN}$, $T_A=T_J=25^{\circ}C$, unless otherwise noted.) (Note 1)

LDO Regulator

PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNITS	
Input Voltage (Note 2)	V_{IN}		Note2	---	5.5	V	
Output Voltage Accuracy	V_{OUT2}	Variation from specified V_{OUT2} , $I_{OUT2}=1mA$, $V_{OUT2} \geq 2.5V$ version	-2	---	2	%	
Maximum Output Current			---	300	---	mA	
Current Limit (Note 3)	I_{LIM}		---	500	---	mA	
Ground Pin Current	I_Q	$V_{IN}=3.6V$	$I_{LOAD}=0mA$	---	55	120	μA
			$I_{LOAD}=50mA$	---	145	---	
			$I_{LOAD}=300mA$	---	265	---	
Dropout Voltage (Note 4)	V_{DROP}	$I_{OUT2}=1mA$		---	2	---	mV
			$I_{OUT2}=50mA$, $V_{OUT2} \geq 2.7V$ Version	---	70	---	
		$I_{OUT2}=150mA$	$V_{OUT2(NOM)} \geq 3.0V$	---	230	---	
			$2.5V \leq V_{OUT2(NOM)} \leq 2.85V$	---	250	---	
			$V_{OUT2(NOM)} = 1.8V$	---	380	---	
		$I_{OUT2}=300mA$	$V_{OUT2(NOM)} = 1.5V$	---	510	---	
			$V_{OUT2(NOM)} \geq 3.0V$	---	450	600	
			$2.5V \leq V_{OUT2(NOM)} \leq 2.85V$	---	500	660	
		$V_{OUT2(NOM)} = 1.8V$	---	760	1500		
		$V_{OUT2(NOM)} = 1.5V$	---	910	1800		
Line Regulation	ΔV_{LNR}	$V_{IN}=V_{OUT2}+100mV$ to 5.5V, $I_{OUT2}=1mA$	---	0.1	0.28	%/V	
Load Regulation (Note 5)	ΔV_{LDR}	$I_{OUT2}=10mA$ to 300mA	---	0.1	1	%	
Output Voltage Temperature Coefficient	$\Delta V_o / \Delta T$	$I_{OUT2}=50mA$, $T_J=25^{\circ}C$ to $125^{\circ}C$	---	30	---	ppm/ $^{\circ}C$	
EN2							
EN2 Input Threshold	V_{IH}	Regulator enabled	15	---	---	V	
	V_{IL}	Regulator shutdown	---	---	0.4		
EN2 Input Bias Current	I_{EN2}	$V_{EN2}=V_{IN}$, $T_A=+25^{\circ}C$	---	0.003	0.1	μA	
Shutdown Supply Current	I_{OFF}	$V_{OUT2}=0V$, $T_A=+25^{\circ}C$	---	---	1	μA	
THERMAL PROTECTION							
Thermal Shutdown Temperature	T_{SHDN}		---	150	---	$^{\circ}C$	
Thermal Shutdown Hysteresis	ΔT_{SHDN}		---	15	---	$^{\circ}C$	

Note 1: Limits is 100% production tested at $T_A=+25^{\circ}C$. Low duty pulse techniques are used during test to maintain junction temperature as close to ambient as possible.

Note 2: $V_{IN(min)}=V_{OUT2}+V_{DROPOUT}$

Note 3: Not tested. For design purposes, the current limit should be considered 400mA minimum to 600mA maximum.

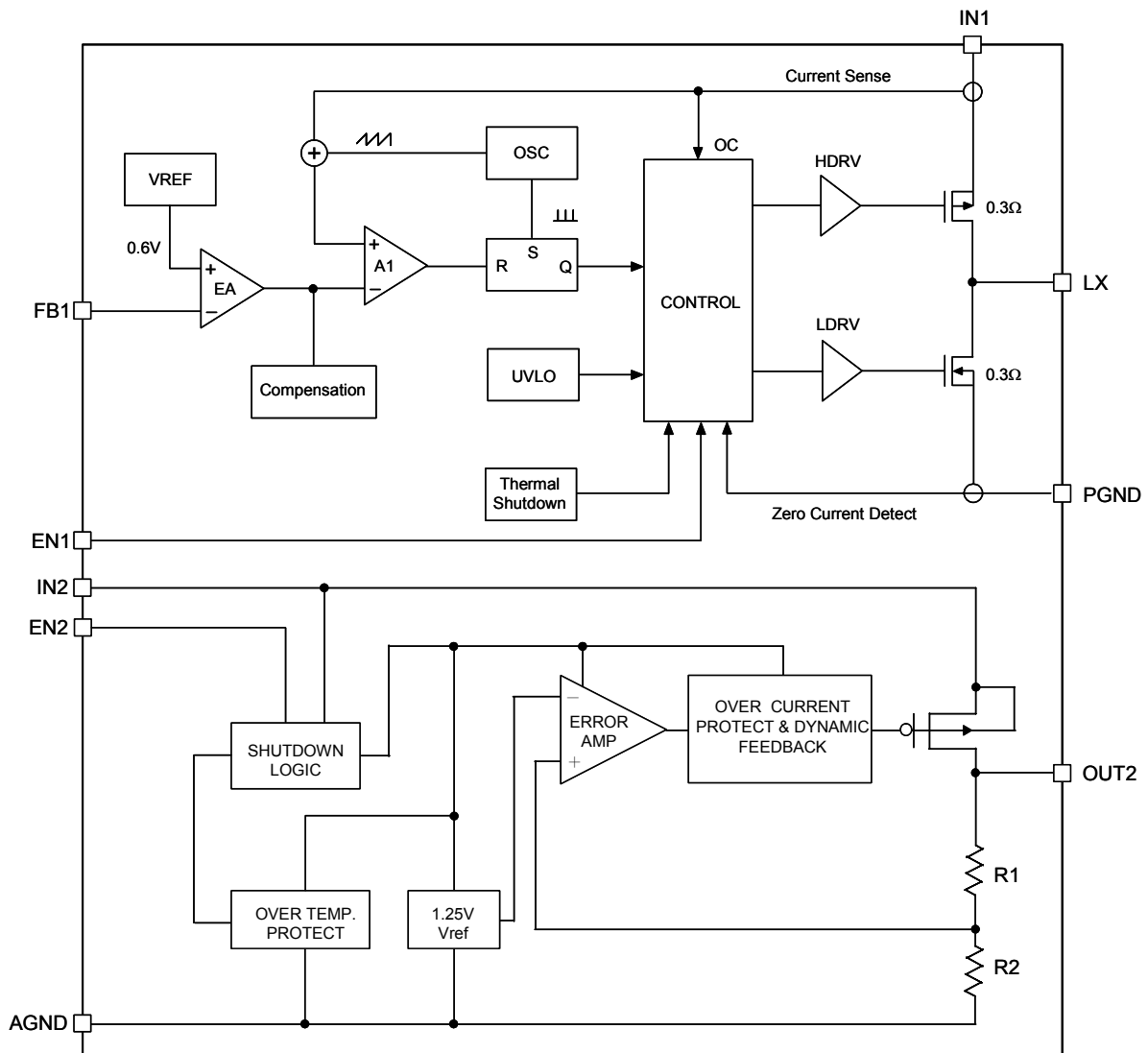
Note 4: The dropout voltage is defined as $(V_{IN} - V_{OUT2})$ when V_{OUT} is 100mV below the value of V_{OUT2} for $V_{IN} = V_{OUT2} + 1V$.

Note 5: Regulation is measured at constant junction temperature using low duty cycle pulse testing. Parts are tested for load regulation in the load range from 1mA to 300mA. Changes in output due to heating effects are covered by the thermal regulation specification.

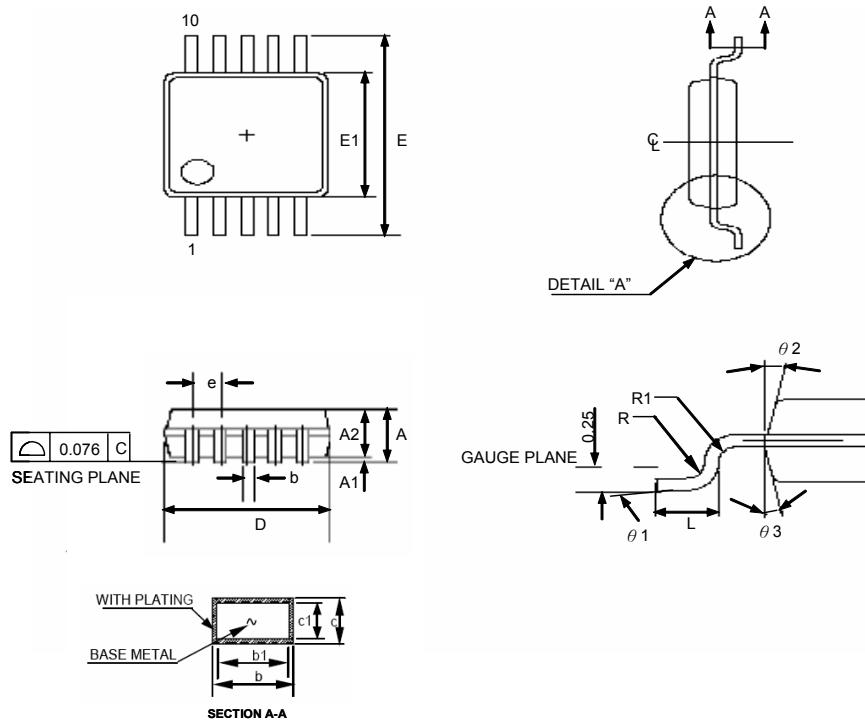
Pin Descriptions

PIN	NAME	FUNCTION
1	EN1	Buck Converter Enable Control Pin (Active high, do not leave EN pin floating)
2,4	AGND	Ground Pin
3	FB1	Buck Converter Feedback Pin
5	EN2	LDO Enable Control Pin
6	IN2	LDO Power Input
7	OUT2	LDO Output
8	IN1	Buck Converter Power Input
9	PGND	Buck Converter Power Ground Pin
10	LX	Buck Converter Switching Pin

Block Diagram



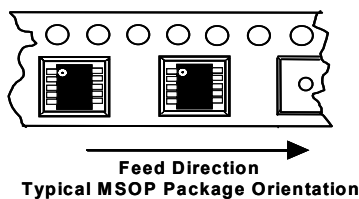
Package Information



MSOP-10 Package

SYMBOL	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	----	----	1.10	----	----	0.043
A1	0.05	----	0.15	0.002	----	0.006
A2	0.81	0.86	0.91	0.032	0.034	0.036
b	0.15	----	0.30	0.006	----	0.012
b1	0.15	0.20	0.25	0.006	0.008	0.010
c	0.13	----	0.23	0.005	----	0.009
c1	0.13	0.15	0.18	0.005	0.006	0.007
D	2.90	3.00	3.10	0.114	0.118	0.122
E1	2.90	3.00	3.10	0.114	0.118	0.122
e	0.50 BSC			0.020 BSC		
E	4.90 BSC			0.193 BSC		
L	0.445	0.55	0.648	0.0175	0.0217	0.0255
theta 1	0°	----	6°	0°	----	6°
theta 2	12 REF			12 REF		
theta 3	12 REF			12 REF		
R	0.09	----	----	0.004	----	----
R1	0.09	----	----	0.004	----	----
JEDEC	MO-187BA					

Taping Specification



PACKAGE	Q'TY/REEL
MSOP-10	2,500 ea

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