



LC2300

PWM/PFM Step-down DC-DC Controller

DESCRIPTION

The LC2300 is a CMOS-based PWM step-down DC-DC Controller. The device offers the following advantages: lower supply current and wider operating input-voltage range.

The LC2300 consists of an oscillator, a PWM control circuit, a reference voltage unit, an error amplifier, a soft-start circuit, a protection circuit, a PWM/PFM alternative circuit, a Chip Enable circuit, and under voltage lockout circuit. A low ripple, high efficiency step-down DC-DC converter can be easily composed of this IC. Output Voltage can be adjusted with external resistors.

The LC2300 uses voltage type PWM/PFM mixed operation mode. When the load current is small, the operation will switch into the PFM mode from PWM mode. Therefore the efficiency at small load is improved, and then the chip works on PWM mode.

The LC2300 embeds reset type protection circuit. If the term of maximum duty cycle keeps on a certain time, the protection circuit restarts the operation with soft-start and repeat this operation until maximum duty cycle condition is released. When the cause of large load current is removed, the chip returns to normal condition.

FEATURES

- Range of Input Voltage: 3V~16V
- Built-in Soft-start Function and Protection Function(Reset type protection)
- <1μA Shutdown Current and 80uA Quiescent Current
- Oscillation Frequency: 500KHz
- High efficiency: 95%
- High Accuracy Output Voltage:±2.0%
- Low Temperature Coefficient: ±100ppm/°C
- Operating Temperature Range: -40°C ~85°C
- Small Package:SOT23-5
- Demo Board Available

APPLICATIONS

- Power source for hand-held communication equipment, cameras, video instruments such as VCRs, camcorders.
- Power source for battery-powered equipment.
- Power source for household electrical appliance

ORDERING INFORMATION

LC2300CB5TR

Code	Description
LC2300	Product code
C	Temperature & Rohs: C: -40~85°C, Pb Free Rohs Std.
B5	Package Type: SOT23-5
TR	Tape & Reel (Standard), 3000pcs/Reel

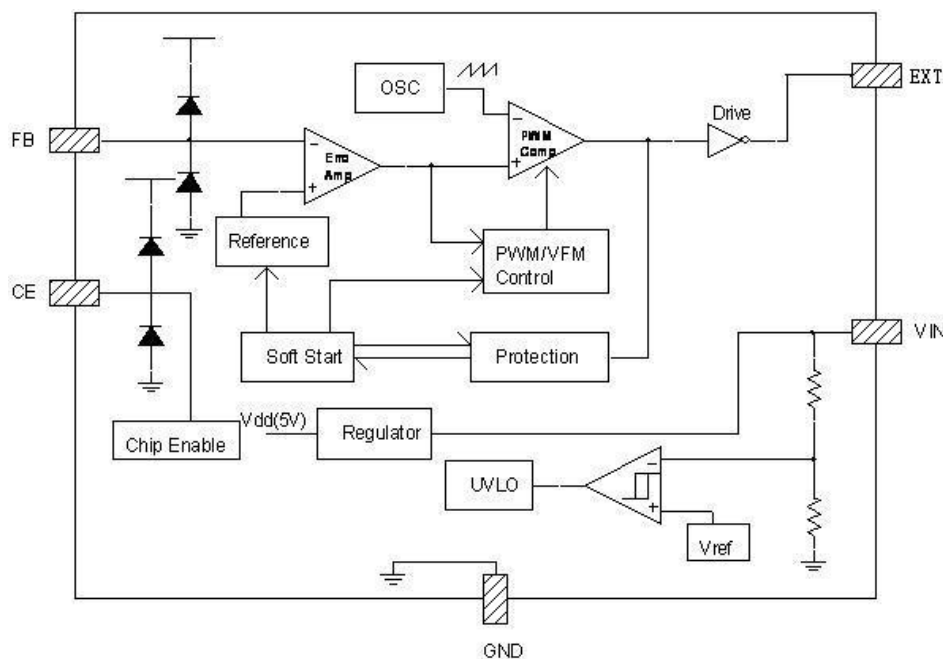
PIN CONFIGURATION

Product ID		LC2300CB5TR
Marking		
HE	Product Code	
Y	Year	
W	Week	

PIN DESCRIPTION

Pin No.	Symbol	Description
1	CE	Chip Enable Pin (Active with "H")
2	GND	Ground Pin
3	FB	Pin for Feedback Voltage
4	EXT	Switching Pin
5	VIN	Power Supply Pin

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATING

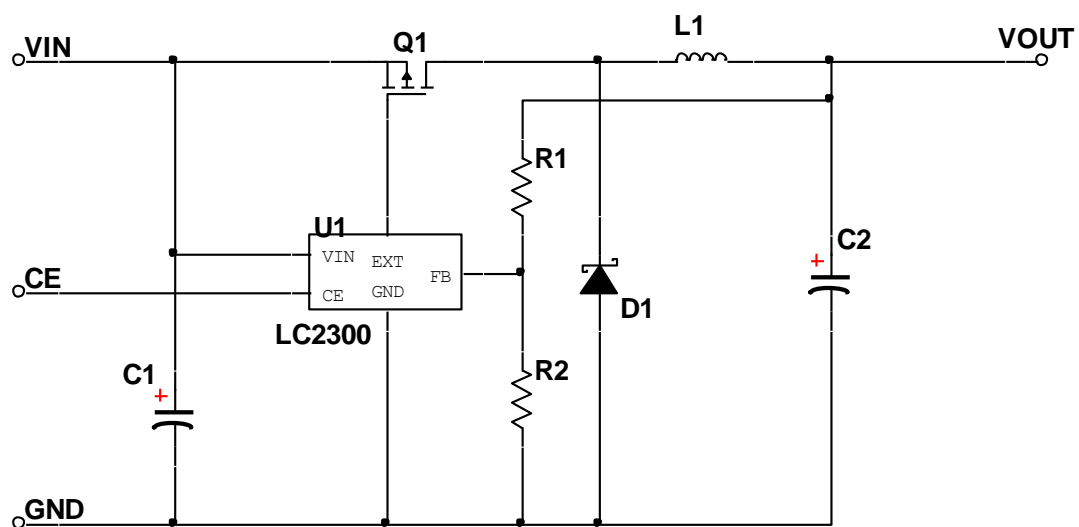
Supply Voltage	-0.3V to 18V
CE Pin Voltage	-0.3V to Vin+0.3V
EXT Pin Voltage	-0.3V to Vin+0.3V
FB Pin Voltage	-0.3V to 6V
Operating Ambient Temperature Range	-40°C to 85°C
Storage Temperature Range	-65°C to 150°C
Lead Temperature (Soldering, 10 sec)	260°C
Thermal resistance: θ_{JA}	150°C/W

ELECTRICAL CHARACTERISTICS

(Test condition: $T_a=25^{\circ}\text{C}$, $V_{IN}=12\text{V}$, unless otherwise noted.)

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
V_{IN}	Operating Input Voltage		3		16	V
V_{FB}	Feedback Voltage	$V_{IN}=V_{CE}=12\text{V}$, $I_{out}=100\text{mA}$	1.196	1.221	1.246	V
$\Delta V_{FB}/\Delta T$	Feedback Voltage Temperature Coefficient	$-25^{\circ}\text{C} \leq T_{opt} \leq 85^{\circ}\text{C}$		± 100		ppm/ $^{\circ}\text{C}$
f_{osc}	Oscillator Frequency	$V_{IN}=V_{CE}=12\text{V}$, $I_{out}=100\text{mA}$	300	500	700	KHz
$\Delta f_{OSC}/\Delta T$	Oscillator Frequency Temperature Coefficient	$-25^{\circ}\text{C} \leq T_{opt} \leq 85^{\circ}\text{C}$		± 0.2		%/ $^{\circ}\text{C}$
I_{DD1}	Supply Current 1	$V_{IN} = V_{CE} = 12\text{V}$ $V_{FB} = 1.4\text{V}$		80		μA
I_{stb}	Standby Current	$V_{IN}=12\text{V}$, $V_{CE}=0\text{V}$		0	1	μA
I_{CEH}	CE "H" Input Current	$V_{IN} = V_{CE} = 12\text{V}$		0	0.5	μA
I_{CEL}	CE "L" Input Current	$V_{IN} = 12\text{V}$, $V_{CE} = 0\text{V}$	-0.5	0		μA
V_{CEH}	CE "H" Input Voltage	$V_{IN} = 12\text{V}$	1.5			V
V_{CEL}	CE "L" Input Voltage	$V_{IN} = 12\text{V}$			0.3	V
V_{UVLO1}	UVLO Threshold Voltage	$V_{IN}=V_{CE}=5$ to 0V	1.5	1.9	2.3	V
V_{UVLO2}	UVLO Release Voltage	$V_{IN}=V_{CE}=0$ to 5V	1.6	2.0	2.4	V
$Maxdty$	Oscillator Maximum Duty Cycle				100	%
T_{start}	Delay Time by Soft-start function	$V_{IN} = 12\text{V}$, $V_{CE} = 0 \rightarrow 8\text{V}$	2	5	10	ms
T_{prot}	Delay Time for protection circuit	$V_{IN} = V_{CE} = 12\text{V}$ $V_{FB} = 2.5\text{V} \rightarrow 0\text{V}$	150	200	250	μs

TYPICAL APPLICATION CIRCUIT

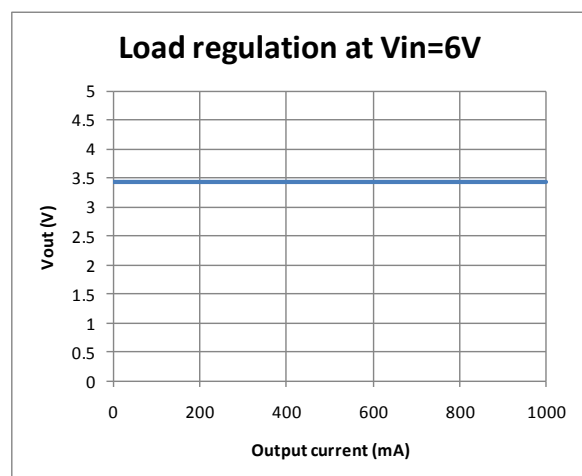
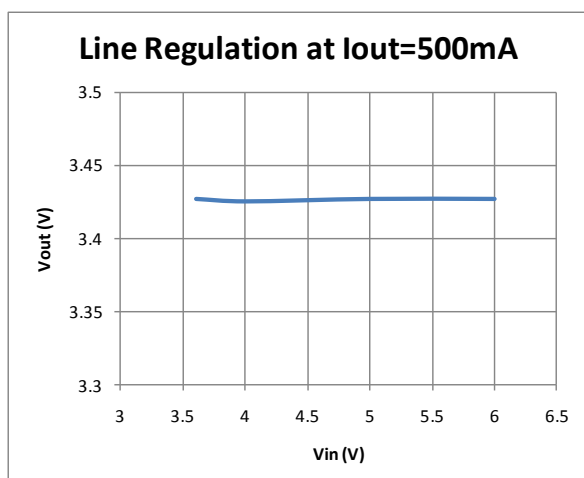
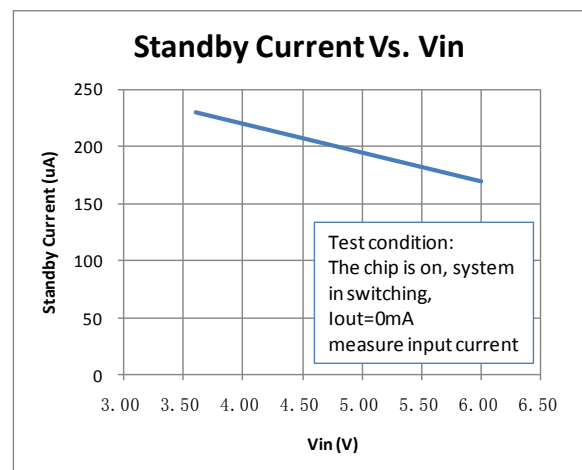
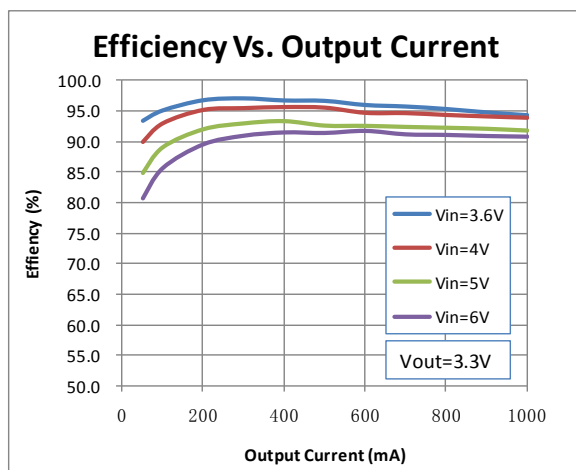


DEMO BOARD BOM

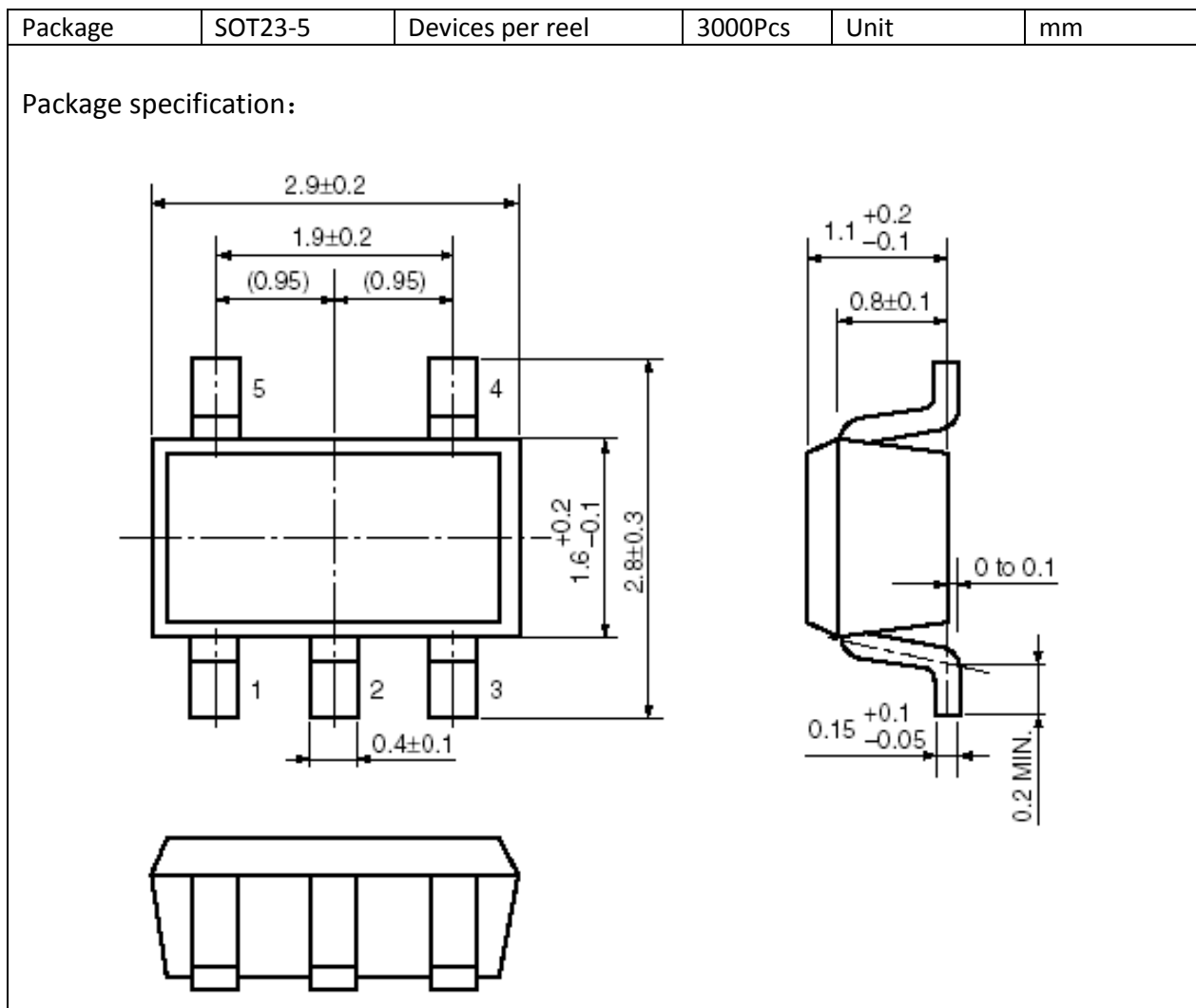
No.	Reference	Type	Specification
1	C1	Capacitor	Tantalum Capacitor; 25V/47uF; SMD
2	C2	Capacitor	Tantalum Capacitor; 25V/47uF; SMD
3	D1	Diode	SS34; 40V, 3A; SMD
4	L1	Inductor	10uH; 3A; SMD, Shielding
5	IC1	IC	LC2300; SMD SOT23-5
6	R1	Resistor	SMD 0805; 1%
7	R2	Resistor	SMD 0805; 1%
8	Q1	MOSFET	2301;-20V,-3.4A,P-MOS;SMD SOT23-3

ELECTRICAL PERFORMANCE

(Test condition: $T_a=25^\circ\text{C}$, configuration as what is listed in above demo board BOM, unless otherwise noted.)



PACKAGE OUTLINE




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