



1.2MHZ, 2.5A SYNCHRONOUS STEP-DOWN CONVERTER

DESCRIPTION

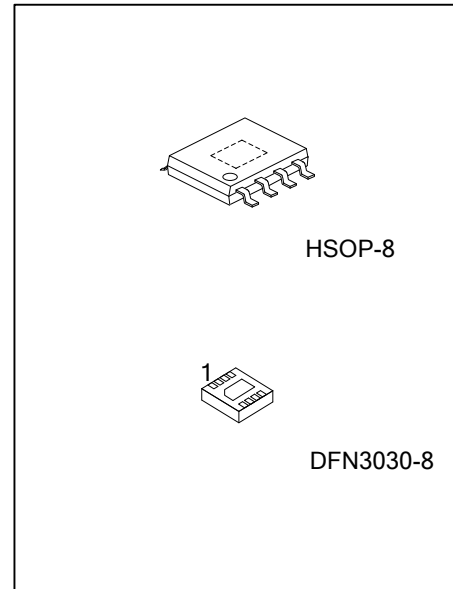
The **UTC UD05251** is a 1.2MHz constant frequency current mode PWM step-down converter. It is ideal for portable equipment requiring very high current up to 2.5A from single-cell Lithium-ion batteries while still achieving over 90% efficiency during peak load conditions.

The **UTC UD05251** also can run at 100% duty cycle for low dropout operation, extending battery life in portable systems while light load operation provides very low output ripple for noise sensitive applications.

The **UTC UD05251** can supply up to 2.5A output current from a 2.6V to 4V input voltage and up to 3A output current from a 4V to 5.5V input voltage. These devices are available in fixed output voltages from 0.6V to V_{IN} in increments of 0.05V and an adjustable output version. The high switching frequency minimizes the size of external components while keeping switching losses low. The internal slope compensation setting allows the device to operate with smaller inductor values to optimize size and provide efficient operation.

FEATURES

- * 2.6V to 5.5V Input Voltage Range
- * Adjustable Output Voltages from 0.6V to V_{IN}
Fixed output voltage from 0.6V to V_{IN} in increments of 0.05V
- * High Efficiency: Up to 94%
- * 1.2MHz Constant Frequency Operation
- * Output Current: Up to 2.5A Output Current
- * No Schottky Diode Required
- * Current Mode Operation for Excellent Line and Load Transient Response
- * Current limit, Enable function
- * Short Circuit Protect (SCP)
- * Build-in Soft Start function
- * $\leq 1\mu A$ Shutdown Current



ORDERING INFORMATION

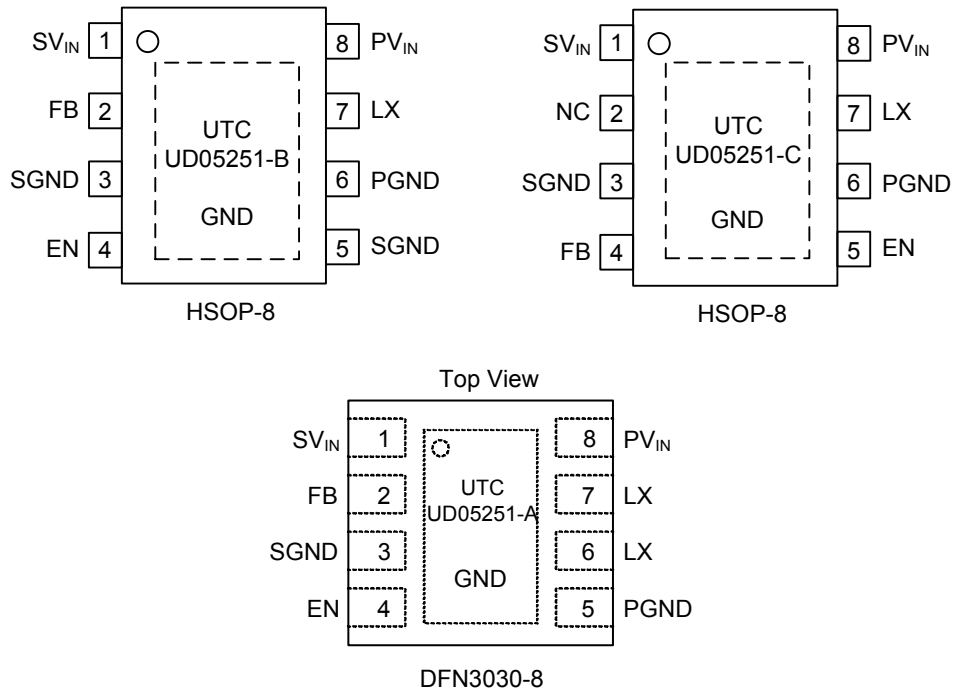
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UD05251L-SH2-B-R	UD05251G-SH2-B-R	HSOP-8	Tape Reel
UD05251L-SH2-C-R	UD05251G-SH2-C-R	HSOP-8	Tape Reel
UD05251L-xx-SH2-B-R	UD05251G-xx-SH2-B-R	HSOP-8	Tape Reel
UD05251L-xx-SH2-C-R	UD05251G-xx-SH2-C-R	HSOP-8	Tape Reel
UD05251L-xx-K08-3030-A-R	UD05251G-xx-K08-3030-A-R	DFN3030-8	Tape Reel

<p>UD05251G-xx-SH2-B-R</p>	<p>(1) Packing Type (2) Pin Code (3) Package Type (4) Output Voltage Code (5) Green Package</p>	<p>(1) R: Tape Reel (2) Refer to PIN CONFIGURATION (3) SH2: HSOP-8, K08-3030: DFN3030-8 (4) xx: refer to Marking Information (5) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
HSOP-8	18: 1.8V AD: ADJ	<p>Date Code ← UTC □□□□ → L: Lead Free Voltage Code ← UD05251 □ → G: Halogen Free Lot Code ← □□□□ → Pin Code Pin Code ← □□□□ → Lot Code</p>
DFN3030-8		<p>Voltage Code ← UD □□ → Voltage Code Pin Code ← UD05251 □□□□ → Date Code</p>

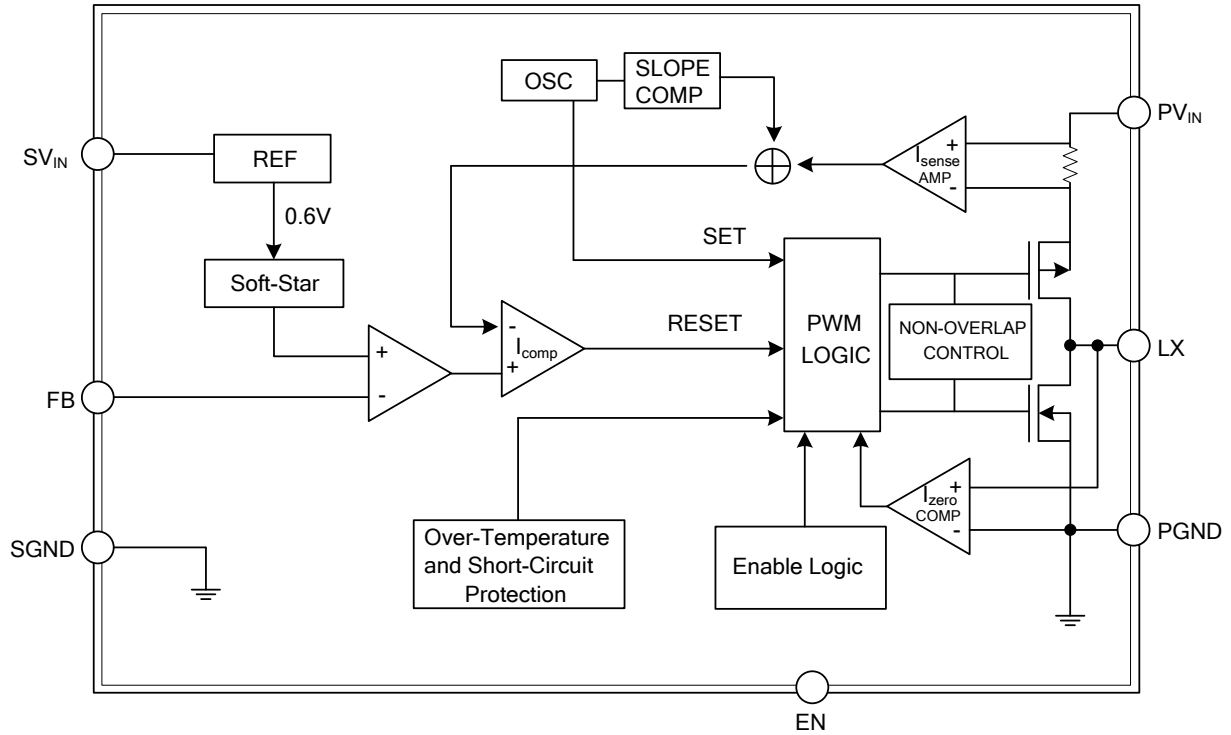
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.		PIN NAME	DESCRIPTION
HSOP-8	DFN3030-8		
B	C	A	
1	1	1	SV_{IN} Signal Supply Input Pin
2	4	2	FB Output Feedback pin
3, 5	3	3	SGND Signal Ground Pin
4	5	4	EN Enable pin H: normal operation L: Shutdown
6	6	5	PGND Power Ground Pin
7	7	6, 7	LX Switch output pin. Connect external inductor here. Minimize trace area at this pin to reduce EMI.
8	8	8	PV_{IN} Power Supply Input Pin
-	2	-	NC

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING ($T_A=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
PV _{IN} , SV _{IN} Pin Voltage	V _{IN}	6	V
Feedback Pin Voltage	V _{FB}	V _{IN}	V
EN Pin Voltage	V _{EN}	V _{IN}	V
Switch Pin Voltage	V _{LX}	V _{IN}	V
Junction Temperature	T _J	+125	°C
Operating Temperature Range	T _{OPR}	-40 ~ +85	°C
Storage Temperature Range	T _{STG}	-40 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL RESISTANCES CHARACTERISTICS

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	HSOP-8	40	°C/W
	DFN3030-8	50	°C/W

Note: θ_{JA} is measured with the PCB copper area of approximately 1 in2 (Multi-layer). That need connect to exposed pad.

■ ELECTRICAL CHARACTERISTICS

For **Adjustable Output Voltage**

(V_{IN}=V_{EN}=3.6V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage Range	V _{IN}		2.6		5.5	V
Feedback Voltage	V _{FB}	T _A =+25°C	0.5880	0.6000	0.6120	V
Feedback Bias Current	I _{FB}	V _{FB} =0.65V			±30	nA
Quiescent Current	I _{CCQ}	V _{FB} =0.8V		50	400	μA
Shutdown Supply Current	I _{SD}	V _{EN} =0V		0.1	1	μA
Switching Current Limit	I _{LIMIT}		2.5	4.0		A
Oscillation Frequency	F _{OSC}	LX Pin	0.8	1.2	1.6	MHz
R _{DS(ON)} of P-CH MOSFET	R _{DSON}	V _{FB} =0V, I _{OUT} =2A		0.14	0.22	Ω
R _{DS(ON)} of N-CH MOSFET (Note)	R _{DSON}			0.12	0.2	Ω
EN Pin Logic Input Threshold Voltage	V _{ENL}				0.4	V
	V _{ENH}		1.5			V
EN Pin Input Current	I _{EN}			±0.1	±1	μA
Thermal Shutdown	T _{SD}			150		°C
Thermal Shutdown Hysteresis	T _{SH}			30		°C

Note: Guaranteed by design.

■ ELECTRICAL CHARACTERISTICS (Cont.)

For **Fixed Output Voltage**

($V_{IN}=V_{EN}=3.6V$, $T_A=25^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage Range	V_{IN}		2.6		5.5	V
Feedback Voltage	V_{FB}	$T_A=+25^\circ C$	1.7640	1.8000	1.8360	V
Feedback Bias Current	I_{FB}	$V_{FB}=V_{FB(T)}+0.2V$			± 30	nA
Quiescent Current	I_{CCQ}	$V_{FB}=V_{FB(T)}+0.2V$		50	400	μA
Shutdown Supply Current	I_{SD}	$V_{EN}=0V$		0.1	1	μA
Switching Current Limit	I_{LIMIT}		2.5	4.0		A
Oscillation Frequency	F_{OSC}	LX Pin	0.8	1.2	1.6	MHz
$R_{DS(ON)}$ of P-CH MOSFET	$R_{DS(ON)}$	$V_{FB}=0V$, $I_{OUT}=2A$		0.14	0.22	Ω
$R_{DS(ON)}$ of N-CH MOSFET (Note)	$R_{DS(ON)}$			0.12	0.2	Ω
EN Pin Logic Input Threshold Voltage	V_{ENL}				0.4	V
	V_{ENH}		1.5			V
EN Pin Input Current	I_{EN}			± 0.1	± 1	μA
Thermal Shutdown	T_{SD}			150		$^\circ C$
Thermal Shutdown Hysteresis	T_{SH}			30		$^\circ C$

Note: Guaranteed by design.

■ FUNCTION DESCRIPTIONS

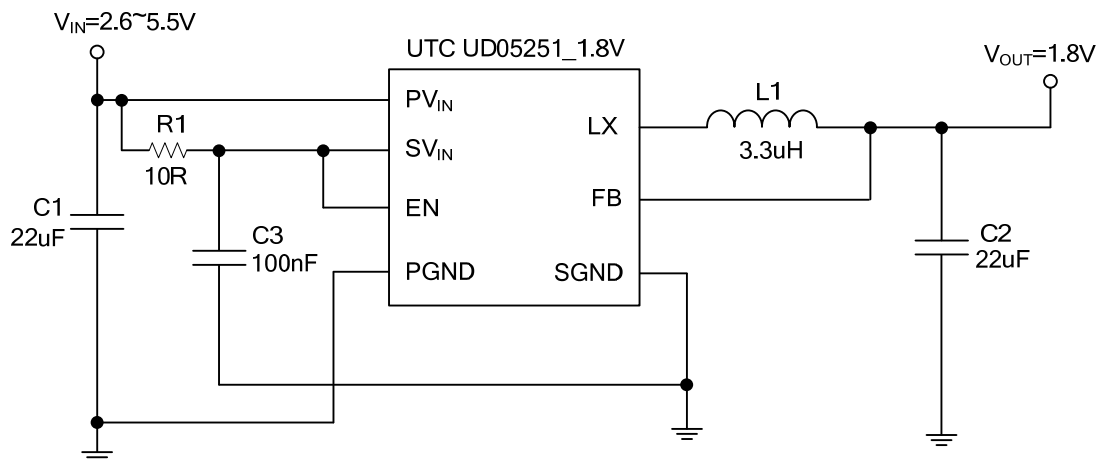
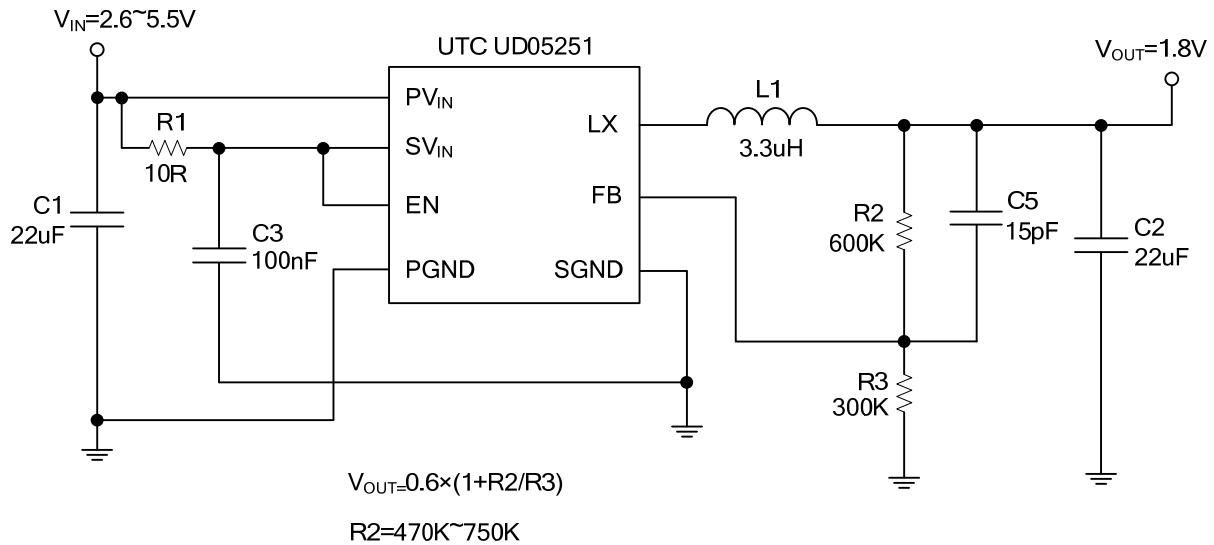
Operation

UTC UD05251 is a monolithic switching mode Step-Down DC-DC converter. It utilizes internal MOSFETs to achieve high efficiency and can generate very low output voltage by using internal reference at 0.6V. It operates at a fixed switching frequency, and uses the slope compensated current mode architecture. This Step-Down DC-DC Converter supplies 2500mA output current at input voltage range from 2.6V to 5.5V.

Current Mode PWM Control

Slope compensated current mode PWM control provides stable switching and cycle-by-cycle current limit for excellent load and line responses and protection of the internal main switch (P-CH MOSFET) and synchronous rectifier (N-CH MOSFET). During normal operation, the internal P-CH MOSFET is turned on for a certain time to ramp the inductor current at each rising edge of the internal oscillator, and switched off when the peak inductor current is above the error voltage. The current comparator, I_{COMP} , limits the peak inductor current. When the main switch is off, the synchronous rectifier will be turned on immediately and stay on until either the inductor current starts to reverse, as indicated by the current reversal comparator, I_{ZERO} , or the beginning of the next clock cycle.

■ TYPICAL APPLICATION CIRCUIT



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