



UD40301

Preliminary

LINEAR INTEGRATED CIRCUIT

40V, 3A, 350KHZ SYNCHRONOUS STEP-DOWN DC/DC CONVERTER

■ DESCRIPTION

The UTC **UD40301** is a synchronous step-down DC/DC converter that provides wide 4.8V~40V input voltage range and 3A continuous load current capability.

Fault protection includes cycle-by-cycle current limit, input UVLO, output over voltage protection and thermal shutdown. Besides, adjustable soft-start function prevents inrush current at turn-on. This device uses current mode control scheme that provides fast transient response. In shutdown mode, the supply current is less than 1uA.

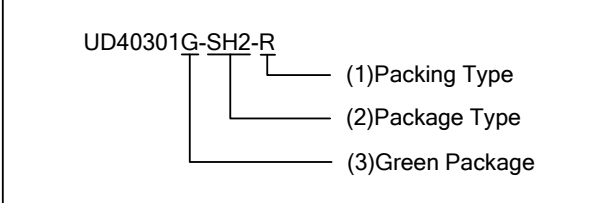
The UTC **UD40301** provides a very compact system solution and good thermal conductance.

■ FEATURES

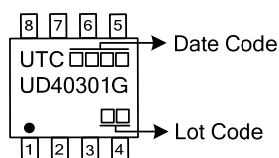
- * Wide Input Voltage from 4.8V~40V
- * 3A Output Current
- * Adjustable Output Voltage from 1V~25V
- * High Efficiency Up to 93%
- * Fixed 350KHz Switching Frequency
- * Current Mode Operation
- * Adjustable Soft-Start
- * Cycle-by-Cycle Current Limit
- * Input Under Voltage Lockout
- * Over-Temperature Protection

■ ORDERING INFORMATION

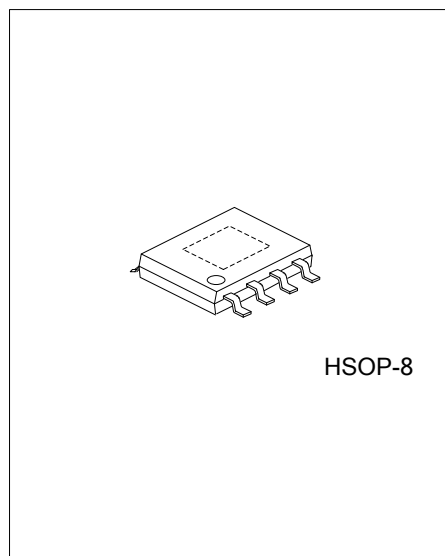
Ordering Number	Package	Packing
UD40301G-SH2-R	HSOP-8	Tape Reel

 <p>UD40301G-SH2-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) R: Tape Reel</p> <p>(2) SH2: HSOP-8</p> <p>(3) G: Halogen Free and Lead Free</p>
--	---

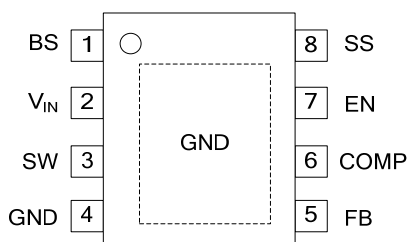
■ MARKING



■ PIN CONFIGURATION



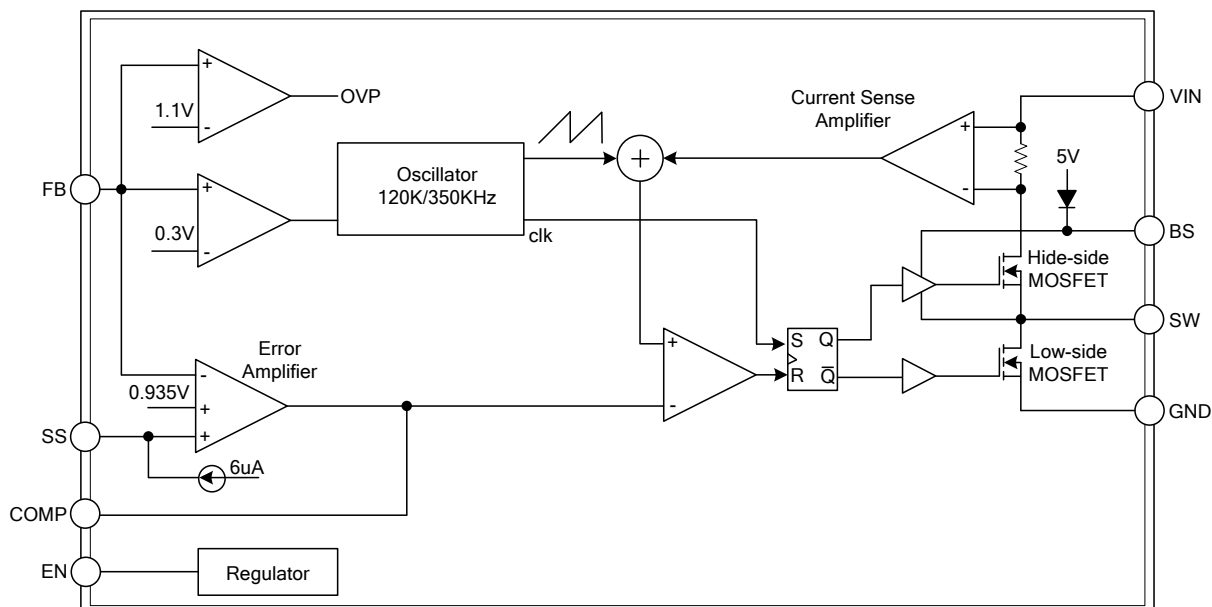
HSOP-8



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	BS	High Side Gate Drive Boost Input. A 10nF or greater capacitor must be connected from this pin to SW. It can boost the gate drive to fully turn on the internal high side NMOS.
2	V _{IN}	Power Supply Input Pin. Drive 4.5V to 24V voltage to this pin to power on this chip. Connecting a 10uF ceramic bypass capacitor between V _{IN} and GND to eliminate noise.
3	SW	Power Switching Output. It is the output pin that internal high side NMOS switching to supply power.
4	GND	Ground Pin. Connecting EP (exposed pad) to Pin 4.
5	FB	Voltage Feedback Input Pin. Connecting FB and V _{OUT} with a resistive voltage divider. This IC senses feedback voltage via FB and regulate it at 0.92V.
6	COMP	Compensation Pin. This pin is used to compensate the regulation control loop. Connect a series RC network from COMP pin to GND.
7	EN	Enable Input Pin. This pin provides a digital control to turn the converter on or off. Connect to V _{IN} with a 100KΩ resistor for self-startup.
8	SS	Soft-Start Input Pin. This pin controls the soft-start period. Connect a capacitor from SS to GND to set the soft start period.

BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (Note 1)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Supply Voltage	V_{IN}	-0.3 ~ +41	V
EN Voltage	V_{EN}	-0.3 ~ +41	V
SW Voltage	V_{SW}	-0.3 ~ 41	V
Boost Voltage	V_{BS}	$V_{SW}+5$	V
All Other Pins Voltage		-0.3 ~ +6	V
Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	-65 ~ +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.

■ RECOMMENDED OPERATING CONDITIONS (Note 2)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Supply Voltage	V_{IN}	4.8 ~ 40	V
Output Voltage	V_{OUT}	1 ~ 25	V
Ambient Temperature	T_A	-40 ~ +85	°C

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction To Ambient	θ_{JA}	105	°C/W
Junction to Case	θ_{JC}	50	°C/W

■ ELECTRICAL CHARACTERISTICS ($V_{IN}=12V$, $T_A=25^\circ C$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN} Input Supply Voltage (Note 3)			4.8		40	V
V_{IN} Supply Current		$V_{EN}=V_{IN}$, $V_{FB}=1.0V$		1.5		mA
V_{IN} Shutdown Supply Current		$V_{EN}=0V$		0.3	3	μA
Feedback Voltage	V_{FB}	$4.8V \leq V_{IN} \leq 40V$	917	935	953	mV
		$-40^\circ C \leq T_A \leq 85^\circ C$	907		963	mV
Feedback OVP Threshold Voltage			1.05	1.1	1.15	V
High-Side MOSFET $R_{DS(ON)}$ (Note 4)				130		m Ω
Low-Side MOSFET $R_{DS(ON)}$ (Note 4)				100		m Ω
High-Side MOSFET Leakage Current		$V_{EN}=0V$, $V_{SW}=0V$			10	μA
High-Side MOSFET Current Limit (Note 4)			3.3	4.5		A
Low-Side MOSFET Current Limit (Note 4)		From drain to source		1.5		A
COMP to Current sense Transconductance	G_{CS}			7		A/V
Error Amplifier Transconductance	G_{EA}	$\Delta I_{COMP}=\pm 10\mu A$		820		$\mu A/V$
Error Amplifier Voltage Gain	A_{EA}			400		V/V
Oscillation Frequency	F_{OSC}		280	350	420	KHz
Short Circuit Oscillation Frequency	F_{OSC}	$V_{FB}=0V$		120		KHz
Maximum Duty Cycle	D_{MAX}	$V_{FB}=0.7V$	80	90		%
Minimum On Time	T_{ON}			180		ns
Input UVLO Threshold		V_{IN} Rising		4.3	4.6	V
Under Voltage Lockout Threshold Hysteresis				200		mV
Soft-Start Current		$V_{COMP}=0V$, $V_{SS}=0V$		6		μA
Soft-Start Period		$C_{SS}=0.1\mu F$		15		ms
EN Shutdown Threshold Voltage				1.5	2.0	V
Thermal Shutdown Threshold (Note 4)				160		°C

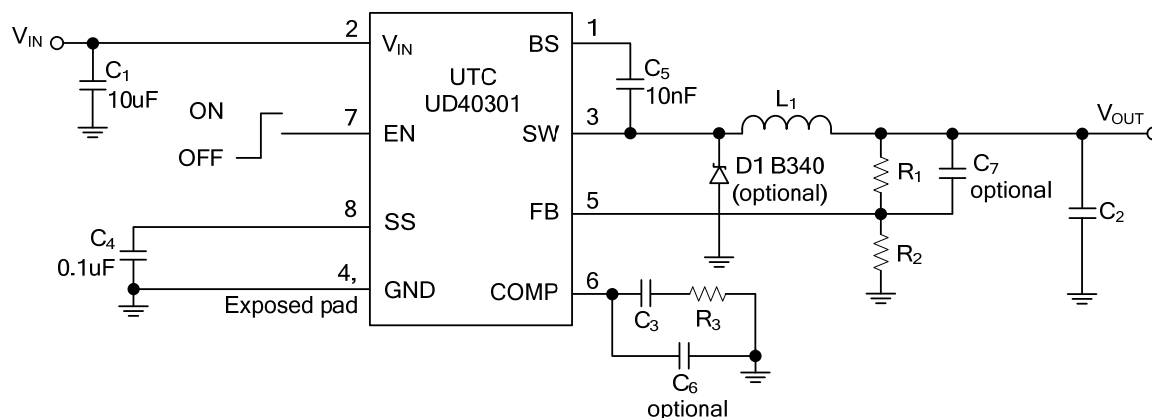
Notes: 1. Stresses exceed those ratings may damage the device.

2. If out of its operation conditions, the device is not guaranteed to function.

3. When $V_{IN}=4.8V$, $V_{OUT}=3.3V$, only load 1.2A.

4. Guaranteed by design.

■ TYPICAL APPLICATION CIRCUIT



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.