



UD24121

LINEAR INTEGRATED CIRCUIT

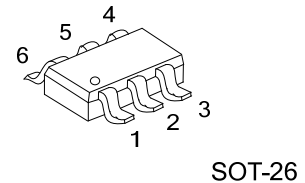
1.2A, 24V, 1.4MHz STEP-DOWN CONVERTER

DESCRIPTION

The UTC **UD24121** is a monolithic step-down switching mode converter with a built-in power MOSFET. It regulates input voltages from 4.5V to 24V down to an output voltage as low as 0.81V, and supplies up to 1.2A of load current.

Current mode operation provides fast transient response and eases loop stabilization. Fault condition protection includes cycle-by-cycle current limiting and thermal shutdown.

The UTC **UD24121** requires a minimum number of readily available standard external components.



APPLICATIONS

- * Distributed Power Systems
- * Battery Charger
- * Pre-Regulator for Linear Regulators
- * WLED Drivers

FEATURES

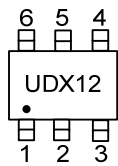
- * 1.2A Peak Output Current
- * 0.35Ω Internal Power MOSFET Switch
- * Stable with Low ESR Output Ceramic Capacitors
- * Up to 92% Efficiency
- * 0.1μA Shutdown Mode
- * Fixed 1.4MHz Frequency
- * Thermal Shutdown
- * Cycle-by-Cycle Over Current Protection
- * Wide 4.5V to 24V Operating Input Range
- * Output Adjustable from 0.81V to 15V

ORDERING INFORMATION

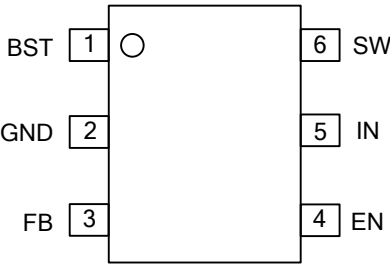
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UD24121L-AG6-R	UD24121G-AG6-R	SOT-26	Tape Reel

UD24121G-AG6-R		
(1)Packing Type	(1) R: Tape Reel	
(2)Package Type	(2) AG6: SOT-26	
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free	

MARKING



PIN CONFIGURATION



PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	BST	High-Side Gate Drive Boost Input. BS supplies the drive for the high-side N-Channel MOSFET switch. Connect a 0.01μF or greater capacitor from SW to BST to power the high side switch.
2	GND	Ground.
3	FB	Feedback. An external resistor divider from the output to GND, tapped to the FB pin sets the output voltage. To prevent current limit run away during a short circuit fault condition, the frequency foldback comparator lowers the oscillator frequency when the FB voltage is below 250mV.
4	EN	On/Off Control Input. Pull EN above 1.2V to turn the device on. For automatic enable, connect a 100kΩ resistor between this pin and Vin pin.
5	V _{IN}	Supply Voltage. The UD24121 operates from a +4.5V to +24V unregulated input. C1 is needed to prevent large voltage spikes from appearing at the input.
6	SW	Power Switching Output. SW is the switching node that supplies power to the output. Connect the output LC filter from SW to the output load. Note that a capacitor is required from SW to BS to power the high-side switch.

The diagram illustrates the control system for a Buck-Boost converter. The input voltage (IN) is connected to the positive terminal of the power stage and also serves as the reference for the error amplifier. The error amplifier compares the input voltage with a feedback signal (FB) and its output is fed into the summing junction (Σ). The summing junction also receives inputs from the current sense amplifier (which monitors the current through the sense resistor RSEN) and the current limit comparator. The output of the summing junction is the error signal, which is fed into the regulator block. The regulator's output is the duty cycle signal (D), which is fed into the driver block. The driver block controls the MOSFET (M1) in the power stage. The power stage output is connected to the load (SW) and also provides feedback to the error amplifier. The error amplifier is configured with a feedback network consisting of a 27pF capacitor and a 400kΩ resistor. The current limit comparator is configured with a 1pF capacitor and a 400kΩ resistor. The current sense amplifier is configured with a 25mΩ sense resistor. The current limit comparator and the PWM comparator are used to generate the duty cycle signal (D) for the driver.

■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
V _{CC} Pin Voltage	V _{IN}	26	V
SW Pin Voltage	V _{SW}	27	V
BOOST Trap Voltage	V _{BST}	V _{SW} +6V	V
All Other Pins Voltage		-0.3V ~ + 6V	V
Power Dissipation	P _D	568	mW
Junction Temperature Range	T _J	+150	°C
Storage Temperature Range	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

PARAMETER	SYMBOL	RATINGS	UNIT
Input Supply Voltage	V _{IN}	4.5 ~ 24	V
Output Voltage	V _{OUT}	0.81 ~ 15	V
Ambient Temperature	T _A	-40 ~ +125	°C
input current into the EN pin		300	μA

Note: The device is not guaranteed to function outside of its operating conditions.

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction To Ambient	θ _{JA}	220	°C/W
Junction to Case	θ _{JC}	110	°C/W

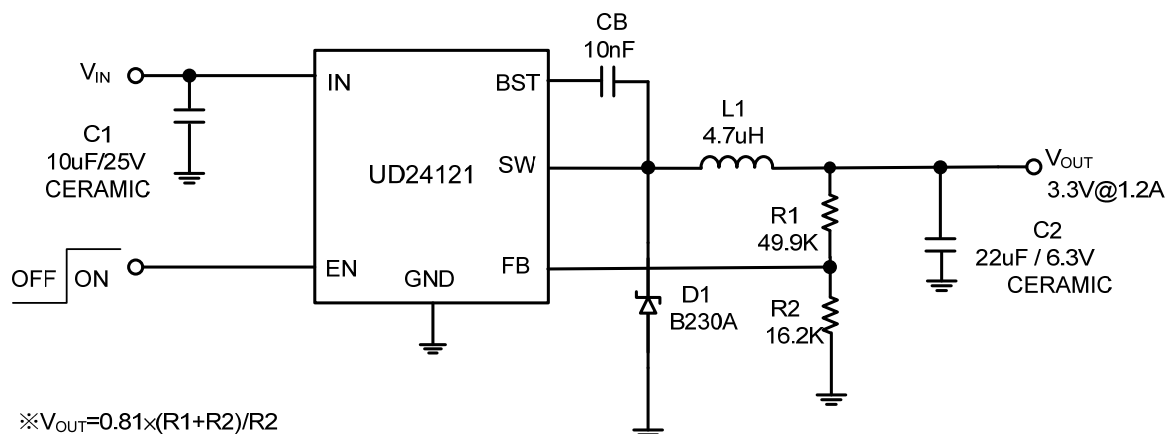
■ ELECTRICAL CHARACTERISTICS

(V_{IN} = 12V, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Quiescent Current	I _Q	V _{EN} =2V, V _{FB} =1V		0.8		mA
Shutdown Current	I _{SHDN}	V _{EN} =0V.		1	3	μA
Switch-On Resistance (Note)	R _{DS-ON}			0.35		Ω
Switch Leakage Current	I _{SWLKG}	V _{EN} =0V, V _{SW} =0V			10	uA
Current Limit (Note)	I _{LIMIT}			1.8		A
Oscillation Frequency	F _{SW}			1.4		MHz
Fold-Back Frequency	F _{SB}	V _{FB} =0V		460		KHz
Max Duty Cycle	D _{MAX}	V _{FB} =0.6V		87		%
Minimum On Time (Note)	T _{ON_MIN}			100		nS
Feedback Voltage	V _{FB}	4.5V ≤ V _{IN} ≤ 18V	0.790	0.810	0.830	V
EN Input High Voltage	V _{EN_H}	V _{EN} Rising	1.2			V
EN Input Low Voltage	V _{EN_L}				0.4	V
EN input Current		V _{EN} =2V		2.1		μA
		V _{EN} =0V		0.1		μA
V _{IN} UVLO Threshold-Rising	V _{UVLO(Vth)}	V _{IN} Rising		2.8		V
V _{IN} UVLO Threshold Hysteresis				150		mV
Thermal Shutdown (Note)	T _{SD}			150		°C
Thermal Hysteresis (Note)				25		°C

Note: Guaranteed by design.

■ TYPICAL APPLICATION CIRCUIT



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