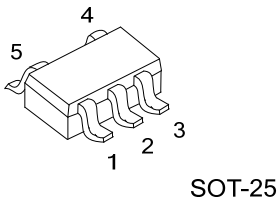
UU28121

CMOS IC

1.2MHz, HIGH VOLTAGE, BOOST CONVERTER



SOT-25

■ DESCRIPTION

The UTC **UU28121** is a current mode step up converter intended for small, low power applications.

The converter input voltage ranging from 2.5V to 5.5V. The Output voltage can be set up to 28V. The frequency is 1.2MHz allows the use of small external inductors and capacitors and provides fast transient response. Internal soft start results in small inrush current and extends battery life. Internal power MOSFET with very low RDS (ON) provides high efficiency. The UTC **UU28121** automatically transits from PWM to PFM during light load condition further increasing efficiency. The converter also provides protection functions such as under-voltage lockout, current limit and thermal shutdown.

■ FEATURES

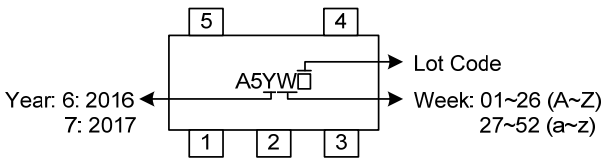
* 2.5V~5.5V operating input voltage range
* 1.2MHz Fixed Switching Frequency
* Adjustable output voltage range up to 28V
* Internal 1.2A switching current limit
* Internal Soft-start Function
* Current limit and Thermal shutdown protection
* Under voltage Lockout

■ ORDERING INFORMATION

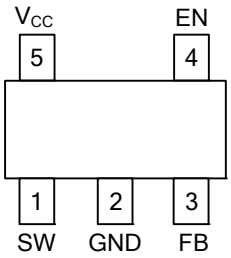
Ordering Number	Package	Packing
UU28121G-AF5-R	SOT-25	Tape Reel

UU28121G-AF5-R (1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AF5: SOT-25 (3) G: Halogen Free and Lead Free

■ MARKING



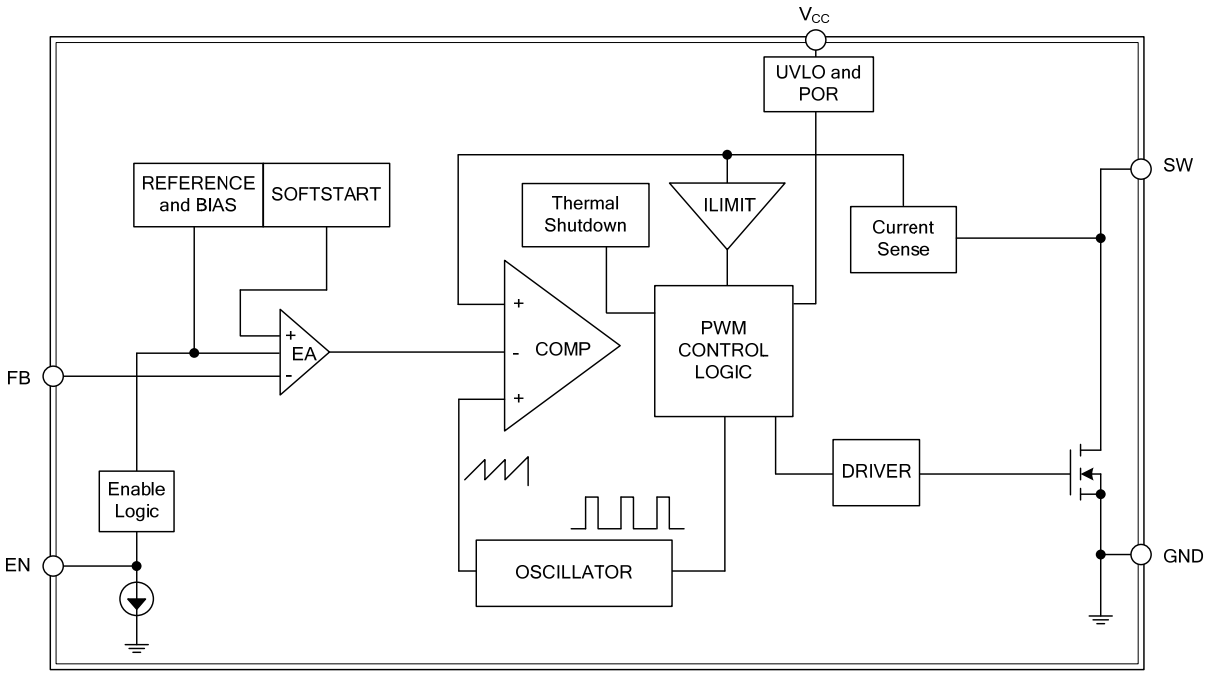
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	SW	Switching Pin.
2	GND	Ground Pin.
3	FB	Feedback Pin.
4	EN	Chip Enable & Dimming pin. Active high. Internal pull low.
5	V_{CC}	V_{CC} Input Pin.

■ BLOCK DIAGRAM



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

PARAMETER	SYMBOL	RATINGS	UNIT
V_{CC} Pin Voltage	V_{IN}	-0.3 ~ 6.5	V
SW Pin Voltage	V_{SW}	-0.3 ~ 30	V
EN, FB Pins Voltage		-0.3 ~ V_{IN}+0.3	V
Operating Junction Temperature	T_{OPR}	-40 ~ +125	°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}	2.5 ~ 5.5	V
Ambient Temperature	T_A	-40 ~ +125	°C

■ THERMAL CHARACTERISTICS

PARAMETER	SYMBOL	RATINGS	UNIT
Junction To Ambient	θ_{JA}	270	°C/W
Junction to Case	θ_{JC}	110	°C/W

Note: θ_{JA} is measured with the PCB copper are (need connect to GND of the UTC UU28121) of approximately 1 in^2 (Multi-layer).

■ ELECTRICAL CHARACTERISTICS

(V_{IN}=5V, V_{EN}=5V, I_{OUT}=20mA, T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage Range	V_{IN}		2.5		5.5	V
Input UVLO	UVLO	Rising		2.25	2.45	V
UVLO Hysteresis				0.2		V
Step-Up Voltage Adjust Range	V_{OUT}		3		28	V
Quiescent Current	I_{CCQ}	I_{OUT}=0mA, V_{FB}=1.5V		150	250	μA
Shutdown Current	I_{SD}	V_{EN}=0V		1	4	μA
FB Pin Voltage	V_{FB}		1.213	1.238	1.263	V
FB Pin Current	I_{FB}	V_{FB}=1.3V			±100	nA
Line Regulation		V_{IN}=2.5~5.5V, I_{OUT}=20mA		0.2		%
Load Regulation		V_{IN}=5V, I_{OUT}=1mA~400mA		0.2		%
Switching Frequency	F_{OSC}		900	1200	1500	KHz
Maximum Duty	D_{MAX}		87	90		%
N-Channel MOSFET Current Limit	I_{LIM}	Duty=50%		1.6		A
MOSFET On-resistance	$R_{DS(on)}$	V_{CC}=3V, I_{SW}=1A		600		mΩ
		V_{CC}=5V, I_{SW}=1A		500		
SW Leakage Current	I_{SWL}	V_{SW}=28V, V_{FB}=1.5V			1	μA
EN High-level Input Voltage	V_{IH}		1.4			V
EN Low-level Input Voltage	V_{IL}				0.4	V
EN Hysteresis	Hys			200		mV
Thermal Shutdown	T_{DS}			150		°C
Thermal Shutdown Hysteresis	T_{SH}			35		°C

■ FUNCTION DESCRIPTION

Setting the Output Voltage

Application circuit item shows the basic application circuit with UTC **UU28121** adjustable output version. The external resistor sets the output voltage according to the following equation:

$$V_{OUT}=1.238V\times(1+\frac{R2}{R1})$$

Table 1. Resistor Selection for Common Output Voltages

V_{OUT}(V)	R1(kΩ)	R2(kΩ)
12	54	470
16	39	470
24	39	720
27	36	750

For most applications, R2 is a suggested a value by 300K~850KΩ. Place the resistor-divider as close to the IC as possible to reduce the noise sensitivity.

Under Voltage Lockout (UVLO)

To avoid mis-operation of the device at low input voltages an under voltage lockout is included that disables the device, if the input voltage falls below (2.25V~200mV).

Input Capacitor Selection

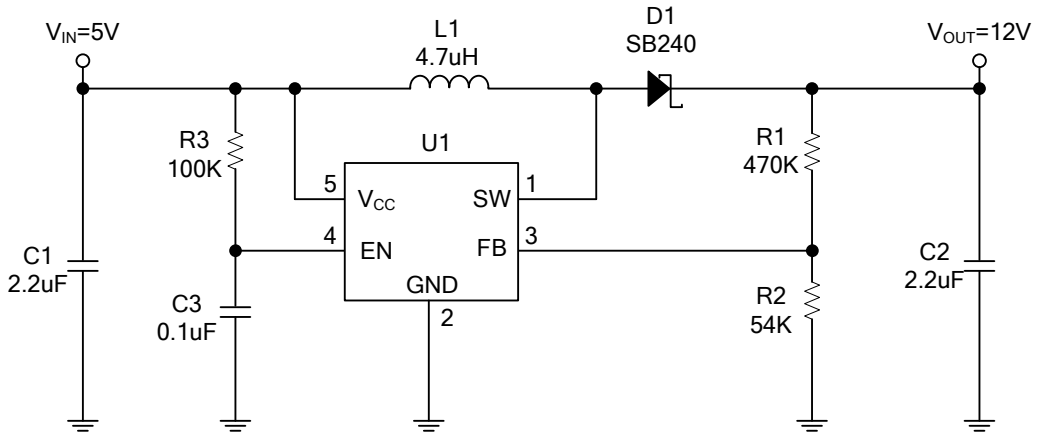
The input capacitor reduces the surge current drawn from the input and switching noise from the device. The input capacitor impedance at the switching frequency shall be less than input source impedance to prevent high frequency switching current passing to the input. A low ESR input capacitor sized for maximum RMS current must be used. Ceramic capacitors with X5R or X7R dielectrics are highly recommended because of their low ESR and small temperature coefficients. A 4.7μF ceramic capacitor for most applications is sufficient. For a lower output power requirement application, this value can be decreased.

Output Capacitor Selection

The output capacitor is required to keep the output voltage ripple small and to ensure regulation loop stability. The output capacitor must have low impedance at the switching frequency. Ceramic capacitors with X5R or X7R dielectrics are recommended due to their low ESR and high ripple current. A 2.2uF ceramic capacitors works for most of the applications. Higher capacitor values can be used to improve the load transient response.

■ TYPICAL APPLICATION CIRCUIT

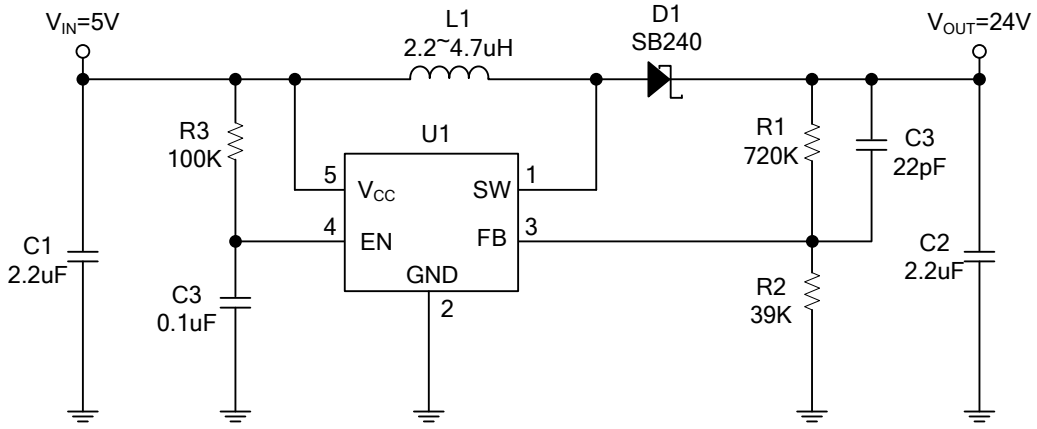
1. V_{OUT} < 18V



$$V_{OUT}=1.238V\times(1+\frac{R1}{R2})$$

R1 Suggest 300K~850K

2. V_{OUT} ≥ 18V

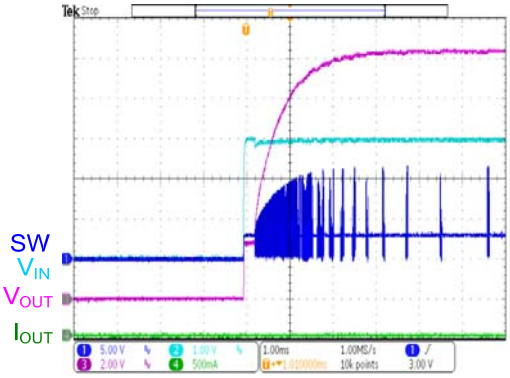


$$V_{OUT}=1.238V\times(1+\frac{R1}{R2})$$

R1 Suggest 300K~850K

■ TYPICAL CHARACTERISTICS

Power On
V_{IN}=3V, V_{OUT}=12V, I_{LOAD}=0A



Steady state
V_{IN}=3V, V_{OUT}=12V, I_{OUT}=50mA