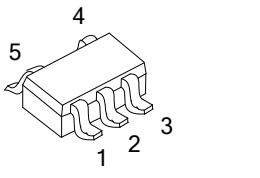
1.5MHz, 1.5A, V_{FB}=0.6V SYNCHRONOUS STEP-DOWN CONVERTER



SOT-25

■ DESCRIPTION

UTC **UD05154** devices are synchronous step-down converters optimized for small solution size and high efficiency. The devices integrate switches capable of delivering an output current up to 1.5A. The devices are based on an adaptive on time with valley current mode control scheme. Typical operating frequency is 1.5MHz at medium to heavy loads. The devices are optimized to achieve very low output voltage ripple even with small external components and feature an excellent load transient response. During a light load, the **UD05154** automatically enter into Power Save Mode at the lowest quiescent current (50μA typ) to maintain high efficiency over the entire load current range. In shutdown, the current consumption is reduced to 1μA. The **UD05154** provide an adjustable output voltage via an external resistor divider. The output voltage start-up ramp is controlled by an internal soft start, typically 300 μs. Power sequencing is possible by configuring the Enable pin. Other features like over current protection and over temperature protection are built in.

■ FEATURES

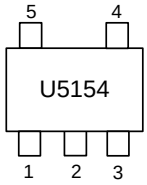
* 2.7V to 5.5V Input Voltage Range
* 1.5MHz Typical Switching Frequency
* Output Current up to 1.5A
* Adaptive On-Time Current Control
* Power Save Mode for Light Load Efficiency
* 50μA Operating Quiescent Current
* Over Current Protection
* Internal Soft Startup of 300μs (Typ.)
* Adjustable Output Voltage
* Thermal Shutdown Protection

■ ORDERING INFORMATION

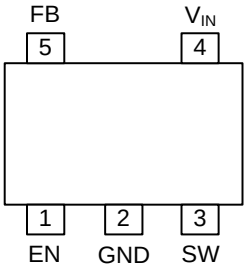
Ordering Number		Package	Packing
Lead Free	Halogen Free		
UD05154L-AF5-R	UD05154G-AF5-R	SOT-25	Tape Reel

UD05154G-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, L: Lead Free

■ MARKING



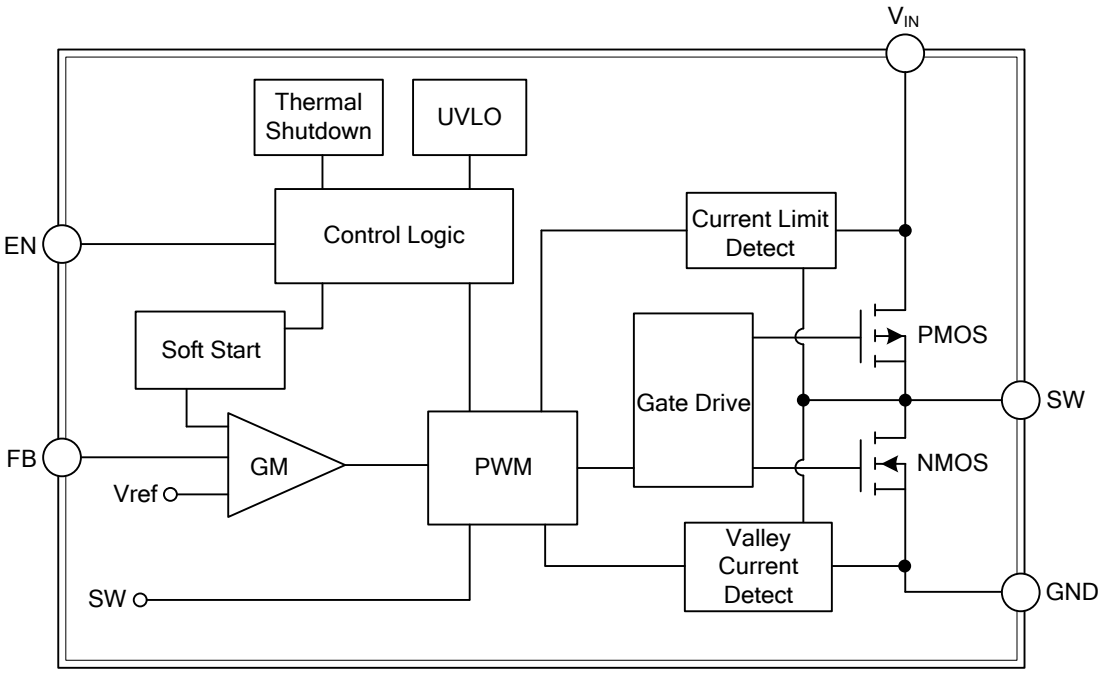
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	EN	Enable pin H: Normal operation；L: Shutdown
2	GND	Ground Pin
3	SW	Switch pin connected to the internal MOSFET switches and inductor terminal. Connect the inductor of the output filter to this pin.
4	V_{IN}	Power Supply Input Pin
5	FB	Feedback pin for the internal control loop. Connect this pin to the external feedback divider.

■ BLOCK DIAGRAM



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

PARAMETER	SYMBOL	RATINGS	UNIT
Voltage range	V_{IN}	7	V
EN Pin Voltage	V_{EN}	7	V
Feedback Pin Voltage	V_{FB}	3.6	V
Switch Pin Voltage	V_{SW}	V_{IN}+0.3	V
Junction Temperature	T_J	+125	°C
Operation Temperature Range	T_{OPR}	-20 ~ +85	°C
Storage Temperature Range	T_{STG}	-20 ~ +85	°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 DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	280	°C/W

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage range	V_{IN}		2.7		5.5	V
Quiescent current into V_{IN} pin	I_Q	Close Loop, I_{OUT}=0mA		50		uA
Under voltage lock out	V_{UVLO}			2.2		V
High-level input voltage	V_{IH}			0.85		V
Low-level input voltage	V_{IL}			0.8		V
Shutdown current into V_{IN} pin	I_{SD}			1		μA
EN leakage current	I_{EN},L_{KG}			1		μA
Feedback regulation voltage	V_{FB}			0.6		V
High-side FET on resistance	$R_{DS(on)}$	I_{SW}=500mA,V_{IN}=3.6V		173		mΩ
Low-side FET on resistance		I_{SW}=500mA,V_{IN}=3.6V		105		mΩ
Low-side FET valley current limit	$I_{LIM, LS}$			2.0		A
High-side FET peak current limit	$I_{LIM, HS}$			3.6		A
Switching frequency	f_{SW}	I_{LOAD}=1A		1.5		MHz
Thermal Shutdown Threshold	T_{SD}			160		°C

■ DETAILED DESCRIPTION

UD05154 operates with an adaptive on-time control scheme, which is able to dynamically adjust the on-time duration based on the input voltage and output voltage so that it can achieve relative constant frequency operation. The device operates at typically 1.5MHz frequency pulse width modulation (PWM) at moderate to heavy load currents.

POWER SAVE MODE

The device integrates a Power Save Mode with PFM to improve efficiency at light load. In Power Save Mode, the device only switches when the output voltage trips below a set threshold voltage. It ramps up the output voltage with several pulses and stops switching when the output voltage is higher than the set threshold voltage. PFM is exited and PWM mode entered in case the output current can no longer be supported in Power Save Mode.

SOFT START

After enabling the device, internal soft-start circuitry monotonically ramps up the output voltage which reaches nominal output voltage during a soft-start time of 300 μs (typical). This avoids excessive inrush current and creates a smooth output voltage rise slope.

SHORT CIRCUIT PROTECTION

To avoid mis-operation of the device, short circuit protection is implemented that latch output to GND when output short.

■ TYPICAL APPLICATION CIRCUIT