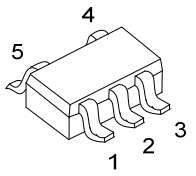
HIGH SIDE POWER SWITCHES



SOT-25

■ DESCRIPTION

The UTC **ULS2621** are slew rate controlled load switches designed for 1.1V to 5.5V operation.

The devices guarantee low switch on-resistance at 1.2V input. They feature a controlled soft-on slew rate of typical 1.0ms that limits the inrush current for designs of heavy capacitive load and minimizes the resulting voltage droop at the power rails.

These devices feature low voltage control logic interface (On/Off interface) that can interface with low voltage control signal without extra level shifting circuit. **ULS2621** also integrates an output discharge switch that enables fast shutdown load discharge.

ULS2621 have exceptionally low shutdown current and provide reverse blocking to prevent high current flowing into the power source.

■ FEATURES

1.1 V to 5.5 V operation voltage range
* 62mΩ typical from 2V to 5V
* Low Ron down to 1.2V
* Slew rate controlled turn-on: 1.0 ms at 3.6V
* Fast shutdown load discharge
* Low quiescent current
  < 1 μA when disabled
  6 μA typical at V_{IN} = 1.2V
* Reverse current blocking when switch is off

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
ULS2621L-AF5-R	ULS2621G-AF5-R	SOT-25	Tape Reel

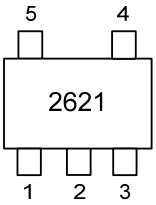
ULS2621G-AF5-R

(1)Packing Type — (1) R: Tape Reel

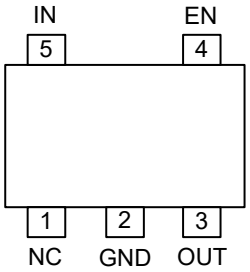
(2)Package Type — (2) AF5: SOT-25

(3)Green Package — (3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



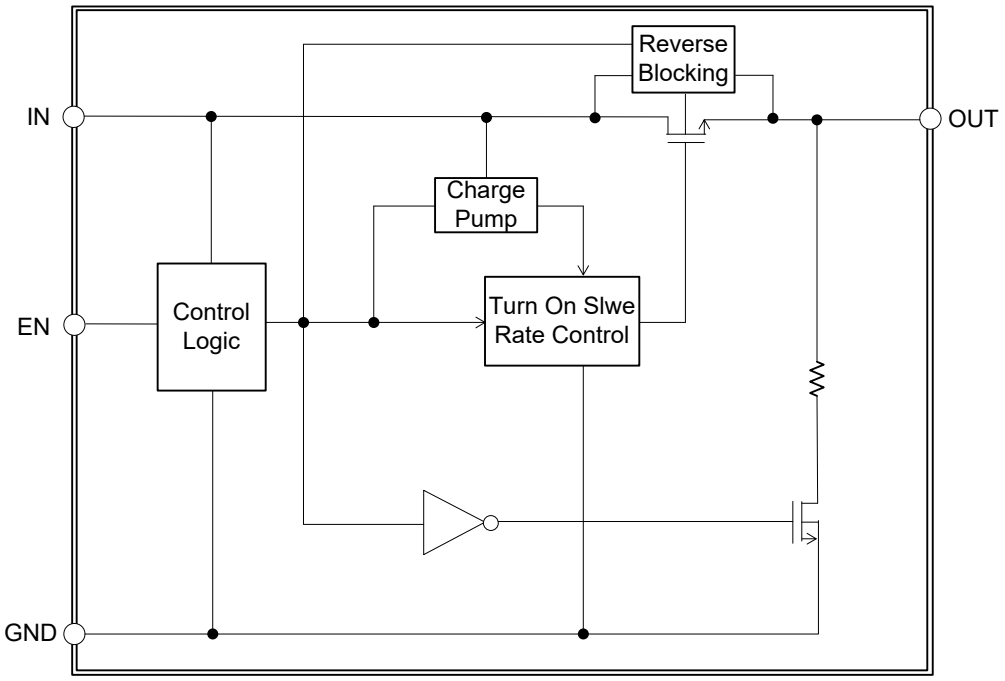
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	NC	No Connection
2	GND	Ground
3	OUT	Output pin of the switch
4	EN	Enable input
5	IN	Input pin of the switch

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	-0.3 ~ +6	V
Enable Voltage	V_{EN}	-0.3 ~ +6	V
Output Voltage	V_{OUT}	-0.3 ~ V_{IN} + 0.3	V
Maximum Continuous Switch Current	I_{MAX}	2.4	A
Maximum Repetitive Pulsed Current (1ms, 10% Duty Cycle)		3	A
Power Dissipation	P_D	480	mW
Junction Temperature	T_J	+150	°C
Storage Temperature (Note 4)	T_{STG}	-55~+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	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Voltage	V_{IN}		1.1		5.5	V
Operating Junction Temperature Range	T_J		-40		+125	°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	260	°C/W

■ ELECTRICAL CHARACTERISTICS (V_{IN}=5V, T_A=-40°C ~ +85°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
STATIC						
Operating Voltage	V_{IN}		1.1		5.5	V
EN Input High Voltage	V_{IH}	V_{IN}=5V	1.8			V
EN Input Low Voltage	V_{IL}	V_{IN}=5V			0.8	V
EN Input Current	$I_{(EN)}$	V_{IN}=V_{EN}=5.5V			1	μA
Quiescent Current	$IQ_{(ON)}$	V_{IN}=5V		16	50	μA
		V_{IN}=3.6V		11	40	μA
		V_{IN}=1.8V		9	30	μA
		V_{IN}=1.2V		6	18	μA
OFF State Leakage Current	$IQ_{(OFF)}$	V_{EN}=0V, V_{IN}=5V, OUT=Open			1	μA
OFF State Leakage Current	I_{LEAK}	V_{EN}=0V, V_{IN}=5V, OUT=GND			1	μA
On-Resistance	$R_{DS(ON)}$	V_{IN}=5V, I_L=-100mA		68	76	mΩ
		V_{IN}=3.6V, I_L=-100mA		66	76	mΩ
		V_{IN}=1.8V, I_L=-100mA		64	76	mΩ
		V_{IN}=1.2V, I_L=-100mA		60	76	mΩ
DYNAMIC						
Turn-ON Delay Time	$t_{D(ON)}$	V_{IN}=3.6V, R_{LOAD}=10Ω		1.0		ms
Turn-ON Rise Time	t_R	V_{IN}=3.6V, R_{LOAD}=10Ω		1.1		ms
Turn-OFF Delay Time	$t_{D(OFF)}$	V_{IN}=3.6V, R_{LOAD}=10Ω		0.6		μs
Turn-OFF Fall Time	t_F	V_{IN}=3.6V, R_{LOAD}=10Ω		1.6		μs

■ DETAILED DESCRIPTION

ULS2621 are advanced slew rate controlled high side load switch consisted of a n-channel power switch. When the device is enable the gate of the power switch is turned on at a controlled rate to avoid excessive in-rush current. Once fully on the gate to source voltage of the power switch is biased at a constant level. The design gives a flat on resistance throughout the operating voltages. When the device is off, the reverse blocking circuitry prevents current from flowing back to input if output is raised higher than input. The reverse blocking mechanism also works in case of no input applied. The **ULS2621** also integrates an output discharge switch which allows fast output discharge.

■ APPLICATION INFORMATION

Input Capacitor

The **ULS2621** do not require an input capacitor. To limit the voltage drop on the input supply caused by transient inrush currents, an input bypass capacitor is recommended. A 2.2 μF ceramic capacitor placed as close to the V_{IN} and GND should be enough. Higher values capacitor can help to further reduce the voltage drop. Ceramic capacitors are recommended for their ability to withstand input current surge from low impedance sources such as batteries in portable devices.

Output Capacitor

While these devices works without an output capacitor, an 0.1 μF or larger capacitor across V_{OUT} and GND is recommended to accommodate load transient condition. It also help to prevent parasitic inductance forces V_{OUT} below GND when switching off. Output capacitor has minimal affect on device's turn on slew rate time. There is no requirement on capacitor type and its ESR.

Enable

The EN pin is compatible with both TTL and CMOS logic voltage levels.

Protection Against Reverse Voltage Condition

The **ULS2621** contain reverse blocking circuitry to protect the current from going to the input from the output in case where the output voltage is higher than the input voltage when the main switch is off. Reverse blocking works for input voltage as low as 0V.

Recommended Board Layout

For the best performance, all traces should be as short as possible to minimize the inductance and parasitic effects.

The input and output capacitors should be kept as close as possible to the input and output pins respectively.

Connecting the central exposed pad to GND, using wide traces for input, output, and GND help reducing the case to ambient thermal impedance.

■ TYPICAL APPLICATION CIRCUIT