



## 80mΩ, 500mA/1.1A HIGH-SIDE POWER SWITCHES WITH FLAG

### DESCRIPTION

The UTC **US201/A** series are 80mΩ, 500mA for **US201** (1.1A for **US201A**) high-side power switches. There's internal single low voltage N-Channel MOSFET which makes it an ideal for all USB applications. This MOSFET should be driven by a charge pump circuitry inside. Its switch on resistance is as low as 80mΩ which we know specially meets the drop voltage for USB applications.

The flag pin can output an open-drain fault flag to next controller.

There're lots internal special ways for protecting the chip's operation.

When in hot-plug events, there's large current which can create the upstream voltage droop to match the USB's voltage droop requirements and soft-start for isolating the power source.

As soon as the die temperature is higher than 130°C, the internal shutdown circuit will work.

Only when there's a normal input voltage in the V<sub>IN</sub> pin, the UVLO (under-voltage lockout, 1.7V typ.) can make sure the chip is still in the off state.

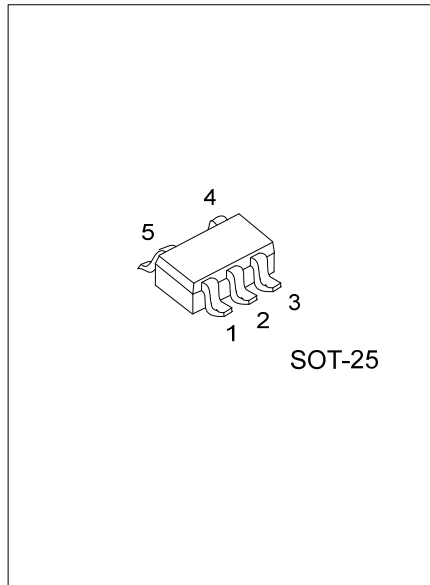
Because of the requirement of USB power the fault current should be ensured less than 800mA (UTC **US201**, single port) and 1.5A (UTC **US201A**, dual ports).

### FEATURES

- \* 80mΩ(Typ) N-Channel MOSFET
- \* Supply Current:
  - Switch on : 25μA(Typ)
  - Switch off : 1μA (Typ)
- \* Load Current 500mA for US201 and 1.1A for US201A
- \* Input Voltage from 2V to 5.5V
- \* In off-State: Output Voltage can be Higher than Input

### ORDERING INFORMATION

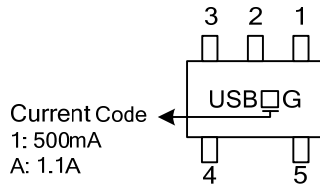
Ordering Number	Package	Packing
US201G-AF5-R	SOT-25	Tape Reel
US201AG-AF5-R	SOT-25	Tape Reel



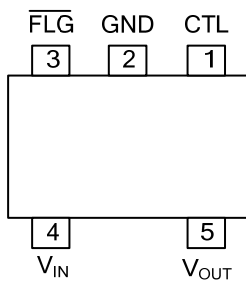
<p>US201AL-AF5-R</p> <ul style="list-style-type: none"> <li>(1)Packing Type</li> <li>(2)Package Type</li> <li>(3)Lead Plating</li> <li>(4)Current Code</li> </ul>	<ul style="list-style-type: none"> <li>(1) R: Tape Reel</li> <li>(2) AF5: SOT-25</li> <li>(3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn</li> <li>(4) Blank: 500mA, A: 1.1A</li> </ul>
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### MARKING



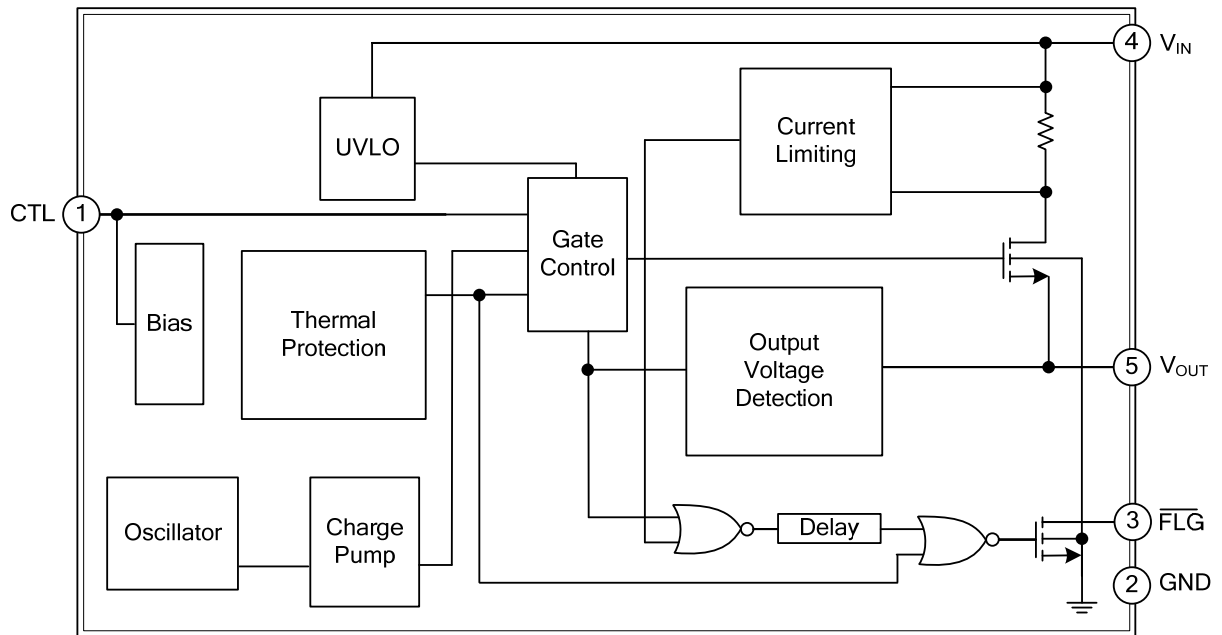
### PIN CONFIGURATION



### PIN DESCRIPTION

PIN NO	PIN NAME	DESCRIPTION
1	CTL	High active
2	GND	Ground
3	FLG	Open-drain fault flag output
4	V <sub>IN</sub>	Power input voltage
5	V <sub>OUT</sub>	Output voltage

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATING

PARAMETER		SYMBOL	RATINGS	UNIT	
Supply Voltage		$V_{CC}$	6.5	V	
			+2~ +5.5 (Note 3)	V	
Input/Output Pins		CTL	$V_{CTL}$	-0.3~ +6.5	V
			FLG	$V_{\overline{FLG}}$	0~ +5.5 (Note 3)
Power Dissipation (Ta=25°C)		$P_D$	0.25	W	
Junction Temperature		$T_J$	150	°C	
			-20~ +100 (Note 3)	°C	
Storage Temperature		$T_{STG}$	-65~ +150	°C	

Note: 1. 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.

2. Stresses listed as the "Absolute Maximum Ratings" will cause permanent damage to the device.

3. The device is not guaranteed to function when it's beyond its operating conditions.

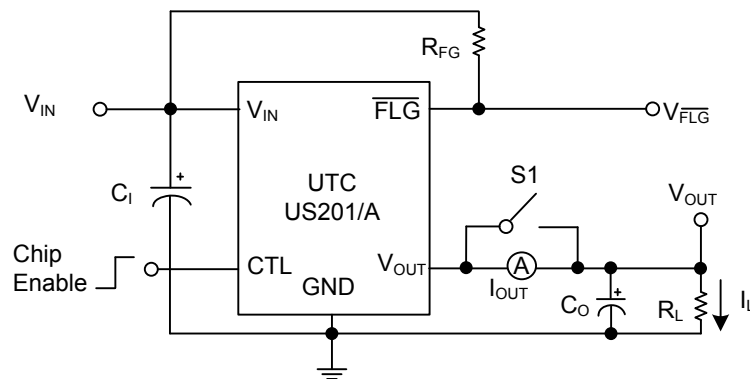
### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	250	°C/W

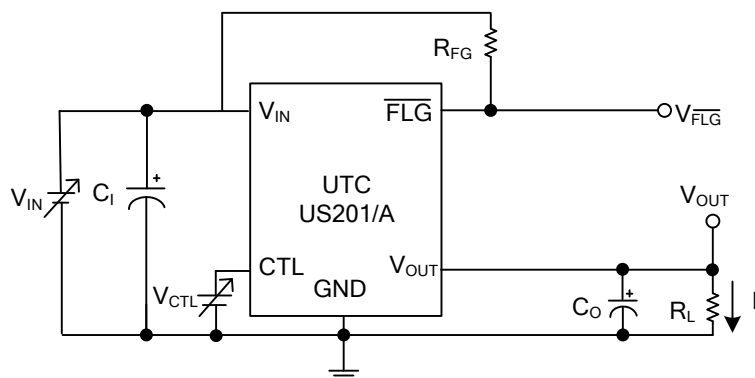
### ■ ELECTRICAL CHARACTERISTICS

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
CTL Threshold	Logic-Low Voltage	$V_{IL}$	$V_{IN}=2V\sim 5.5V$ , Switch OFF			0.8	V	
	Logic-High Voltage	$V_{IH}$	$V_{IN}=2V\sim 5.5V$ , Switch ON	2.0			V	
Under-Voltage Lockout		$V_{UVLO}$	$V_{IN}$ increasing	1.3	1.7		V	
Under-Voltage Hysteresis		$\Delta V_{UVLO}$	$V_{IN}$ decreasing		0.1		V	
Supply Current		$I_{SW(ON)}$	Switch on, $V_{OUT}=OPEN$		25	45	$\mu A$	
		$I_{SW(OFF)}$	Switch off, $V_{OUT}=OPEN$		0.1	1	$\mu A$	
CTL Input Current		$I_{I(CTL)}$	$V_{CTL}=0V\sim 5.5V$		0.01		$\mu A$	
Output Leakage Current		$I_{O(LEAK)}$	$V_{CTL}=0V$ , $R_{LOAD}=0\Omega$		0.5	10	$\mu A$	
Current Limit		$I_{LIMIT}$	$R_{LOAD}=1\Omega$	US201	0.5	0.8	1.1	A
				US201A	1.1	1.5	2.0	A
Short Circuit Fold-Back Current		$I_{SC(FB)}$	$V_{OUT}=0V$ , measured prior to thermal shutdown	US201		0.8		A
				US201A		1.0		A
Switch ON Resistance		$R_{DS(ON)}$	$I_{OUT}=500mA$	US201		80	100	m $\Omega$
			$I_{OUT}=1.1A$	US201A		80	100	m $\Omega$
FLAG OFF Current		$I_{\overline{FLG}(OFF)}$	$V_{\overline{FLG}}=5V$		0.01	1	$\mu A$	
FLAG Output Resistance		$R_{\overline{FLG}}$	$I_{SINK}=1mA$		20	400	$\Omega$	
FLAG Delay Time		$t_D$	From fault condition to $\overline{FLG}$ assertion	2	10	15	ms	
Output Turn-ON Rise Time		$t_{ON(RISE)}$	10% ~ 90% of $V_{OUT}$ rising		400		$\mu s$	
Thermal Shutdown Protection		$T_{SD}$			130		°C	
Thermal Shutdown Hysteresis		$\Delta T_{SD}$			20		°C	

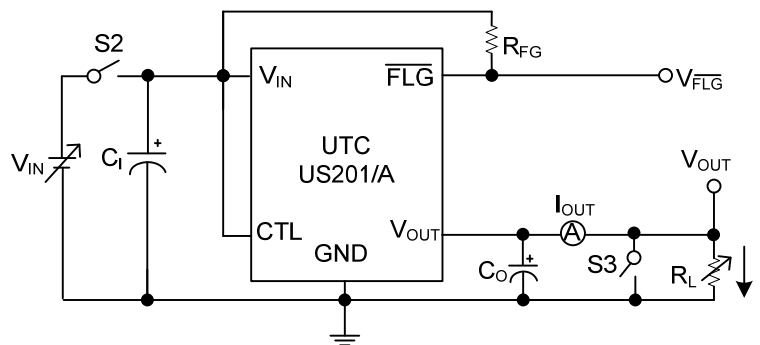
■ TEST CIRCUITS



Turn-On & Off Response, Flag Response

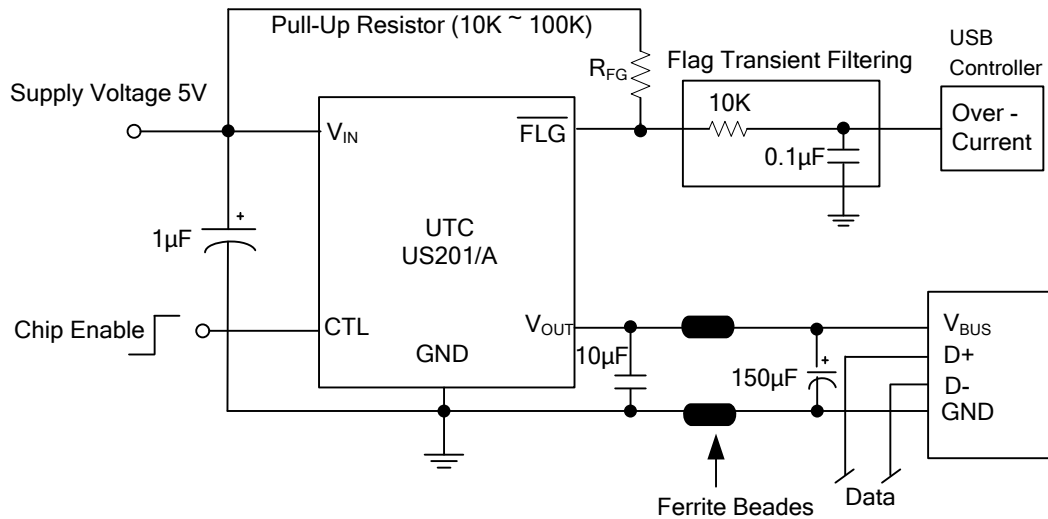


UVLO at Rising & Falling



Current Limit vs. Input Voltage, Inrush Current Response, Current Limit Transient Response

■ TYPICAL APPLICATION CIRCUIT



Note. A low-ESR 150µF aluminum electrolytic or tantalum between V<sub>OUT</sub> and GND is strongly recommended to meet the 330mV maximum droop requirement in the hub V<sub>BUS</sub>.

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