



## US301

Preliminary

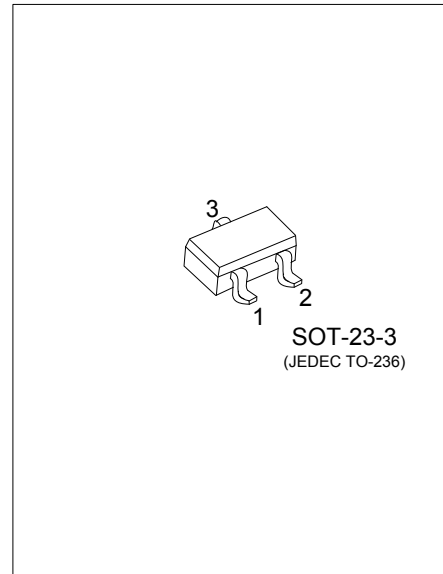
CMOS IC

### 0.2A SINGLE CHANNEL CURRENT-LIMITED LOAD SWITCH

#### DESCRIPTION

The UTC **US301** is single channel current-limited integrated high-side power switches, optimized for hot-swap applications.

The **US301** provides a complete protection solution for application subject to heavy capacitive loads and the prospect of short circuit. The devices have fast short-circuit response time for improving overall system robustness, and offer reverse-current blocking, over-current and over-temperature protection, as well as under-voltage lockout functionality. It also has controlled built-in soft-start time, typically 0.7 ms.



#### FEATURES

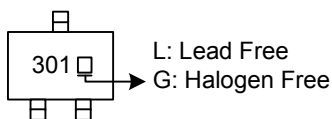
- \* Input voltage range: 2.7V~5.2V
- \* Short-circuit protection and fast response time
- \* Accurate current limiting: 0.4A
- \* On-resistance: 250 mΩ
- \* Reverse-current blocking
- \* Soft-start with 0.7ms typical turn-on time
- \* Over-current and over-voltage protection
- \* Thermal protection
- \* Ambient temperature range: -40°C~+85°C

#### ORDERING INFORMATION

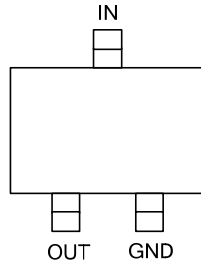
Ordering Number		Package	Packing
Lead Free	Halogen Free		
US301L-AE2-R	US301G-AE2-R	SOT-23-3	Tape Reel

<p>US301G-AE2-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) R: Tape Reel (2) AE2: SOT-23-3 (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	OUT	Switch output pin
2	GND	GND
3	IN	Voltage input pin

### ■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage Relative to GND	$V_{IN}$	6.5	V
Output Voltage Relative to GND	$V_{OUT}$	$V_{IN}+0.3$	V
Maximum Continuous Load Current	$I_{LOAD}$	Internal Limited	A
Maximum Junction Temperature	$T_J$	+150	°C
Storage Temperature Range (Note 4)	$T_{STG}$	-65 ~ +150	°C

Notes: 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. UL Recognized Rating from -30°C~70°C (Diodes qualified  $T_{ST}$  from -65°C~150°C)

### ■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input voltage relative to GND	$V_{IN}$		2.7		5.2	V
Output Current	$I_{OUT}$		0		0.2	A
Operating Ambient Temperature	$T_A$		-40		+85	°C

### ■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , $V_{IN}=+5.0\text{V}$ , unless otherwise stated)

PARAMETER	SYMBOL	TEST CONDITIONS (Note 1)	MIN	TYP	MAX	UNIT
Input UVLO	$V_{UVLO}$	$V_{IN}$ rising	2.35		2.90	V
Input Quiescent Current	$I_Q$	Above UVLO, $I_{OUT}=0$		85	125	$\mu\text{A}$
Reverse Leakage Current	$I_{REV}$	$V_{IN}=0\text{V}$ , $V_{OUT}=5\text{V}$ , $I_{REV}$ at $V_{IN}$		0.01	0.10	$\mu\text{A}$
Switch On-Resistance	$R_{DS(ON)}$	$V_{IN}=5\text{V}$ , $I_{OUT}=0.2\text{A}$	100	250	350	m $\Omega$
Over-Load Current Limit	$I_{LIMIT}$	$V_{IN}=5\text{V}$ , $V_{OUT}=4\text{V}$	0.2	0.4	0.5	A
Short-Circuit Current	$I_{OS}$	OUT shorted to ground	0.2	0.4	0.5	A
Reverse-Current Trigger Point	$I_{ROCP}$	$V_{IN}=5.0\text{V}$ , $V_{OUT}=5.2\text{V}$		0.20	0.25	A
Deglintch Time from Reverse Current Trigger to MOSFET Turn Off	$T_{TRIG}$	(Note 2)	0.5	0.7	1.0	ms
Output Over-Voltage Trip Point	$V_{OVP}$	(Note 3)	5.2		5.6	V
Debounce Time From Output Over-Voltage to MOSFET Turn Off	$T_{OVP}$			15		$\mu\text{s}$
Recovery After Turn-Off from ROCP and OVP	$V_{REC}$			101%		$V_{IN}$
Output turn-on time (Note 4)	$T_{ON}$	$C_L=0.1\mu\text{F}$ , $R_{LOAD}=20\Omega$ (UVLO to 90% $V_{OUT-NOM}$ )		0.7		ms
Thermal Shutdown Threshold	$T_{SHDN}$	$V_{IN}=2.7\text{V}\sim 5.2\text{V}$		150		°C
Thermal Shutdown Hysteresis	$T_{HYS}$			20		°C
Thermal Resistance Junction-to-Ambient (Note 5)	$\theta_{JA}$			215		°C/W

Notes: 1. Pulse-testing techniques maintain junction temperature close to ambient temperature; thermal effects must be taken into account separately.

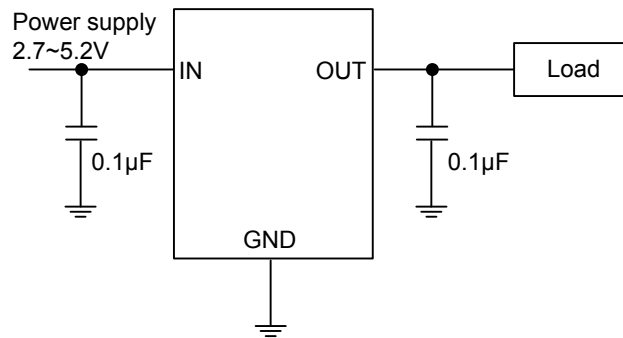
2. When reverse current triggers at  $I_{ROCP}=0.20\text{A}$ , the reverse current is continuously clamped at  $I_{ROCP}$  for 0.7ms deglitch time until MOSFET is turned off.

3. During output over-voltage protection, the output draws approximately 60 $\mu\text{A}$  current.

4. Since the output turn-on slew rate is dependent on input supply slew rate, this limit is only applicable for input supply slew rate between  $V_{IN}/0.2\text{ms}$  to  $V_{IN}/1\text{ms}$ .

5. Device mounted on FR-4 substrate PCB, 2oz copper, with minimum recommended pad layout.

## ■ TYPICAL APPLICATION CIRCUIT



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