



## DESCRIPTION

The A4776 is Adjustable USB Load Current Switch Current Limited designed for high-side load switching applications. The internal current-limiting circuit protects the input supply against large output short circuit current which may cause the supply to fall out of regulation.

The current limit threshold is programmed with an external resistor from ISET Pin to ground. The quiescent supply current is typically 150 $\mu$ A, making the device ideal for portable battery-operated equipment. In shutdown mode, the supply current decreases to less than 0.1 $\mu$ A.

Additional features include thermal shutdown and constant current output characteristics if current exceed its current limit.

The A4776 is available in SOT-25 package.

## ORDERING INFORMATION

Package Type	Part Number	
SOT-25	E5	A4776E5R
		A4776E5VR
Note	V: Halogen free Package R: Tape & Reel SPQ: 3,000pcs/Reel	
AiT provides all RoHS products Suffix " V " means Halogen free Package		

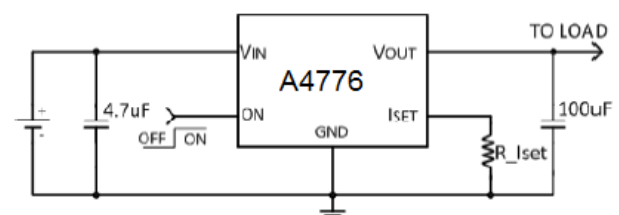
## FEATURES

- 2.5 to 5.5V input voltage range
- Controlled turn-on
- 0.15-1.5A adjustable current limit
- $\pm 6\%$  current limit accuracy
- 0.1 $\Omega$  on resistance
- Fast current limit response time
- Logic Control Shutdown ( $I_{q} < 1\mu A$ )
- Thermal shutdown and UVLO
- Reverse current blocking
- Available in SOT-25 Package

## APPLICATION

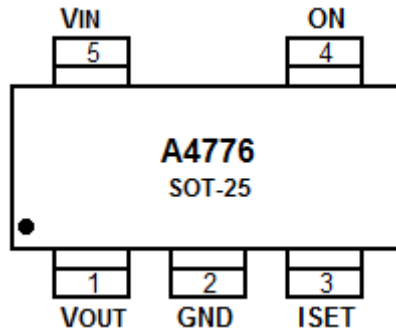
- Portable Devices
- MID, MP4...
- Set top boxes
- Notebook and PC mother board
- USB supplied Devices

## TYPICAL APPLICATION





## PIN DESCRIPTION



Top View

Pin #	Symbol	Function
1	V <sub>OUT</sub>	Switch Output, the output of power switch
2	GND	Ground
3	ISET	Current limit setting pin. Connecting a resistor (R <sub>Iset</sub> ) from this pin to ground will adjust the current limit
4	On	Control input, enable pin, active high
5	V <sub>IN</sub>	Supply input voltage



## ABSOLUTE MAXIMUM RATINGS

Max Input Voltage	6V
T <sub>J</sub> , Max Operating Junction Temperature	125°C
T <sub>A</sub> , Ambient Temperature	-40°C~85°C
Maximum Power Dissipation	SOT-25 250mW
T <sub>s</sub> , Storage Temperature	-40°C~150°C
Lead Temperature & Time	260°C, 10S
ESD (HBM)	>4000V

Stress beyond above listed "Absolute Maximum Ratings" may lead permanent damage to the device. These are stress ratings only and operations of the device at these or any other conditions beyond those indicated in the operational sections of the specifications are not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	MIN	MAX	Units
Input Voltage Range			5.5	V
Operating Junction Temperature	T <sub>J</sub>	-20	125	°C



## ELECTRICAL CHARACTERISTICS

$V_{IN}=5V$ ,  $T_A=25^{\circ}C$

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Voltage Range	$V_{IN}$		2.6		5.5	V
Quiescent Current	$I_Q$	Active, $V_{FB}=0.65$ , No Switching		150	300	$\mu A$
		Shutdown			1	$\mu A$
Switch $R_{DSON}$	$R_{DSON}$	$I_{OUT}=500mA$		100	150	mohm
Adjustable current limit	$I_{LIMIT}$	$R_{Iset}=53K\Omega$		0.5		A
		$R_{Iset}=25K\Omega$		1.0		
		$R_{Iset}=17K\Omega$		1.5		
Reverse Voltage Leakage Current	$I_{REVLK}$	$V_{OUT}=5V$ , $V_{IN}=0V$		0.1	5	$\mu A$
ON Input High Voltage	$V_{H\_ON}$		1.5			V
ON Input Low Voltage	$V_{L\_ON}$				0.4	V
Thermal shutdown Temp.	$T_{SD}$			155		$^{\circ}C$

## SETTING THE CURRENT LIMIT THRESHOLD

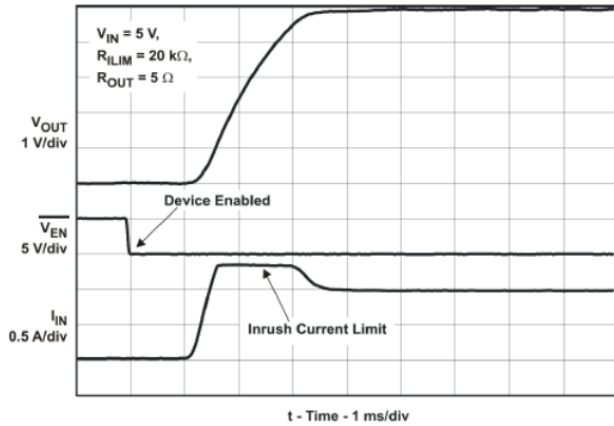
RILIM (K $\Omega$ )	Typical Current Limit (mA)	RILIM (K $\Omega$ )	Typical Current Limit (mA)
200	138	51	520
180	152	43	612
150	179	30	873
100	266	20	1295
82	324	16.9	1500
68	389		



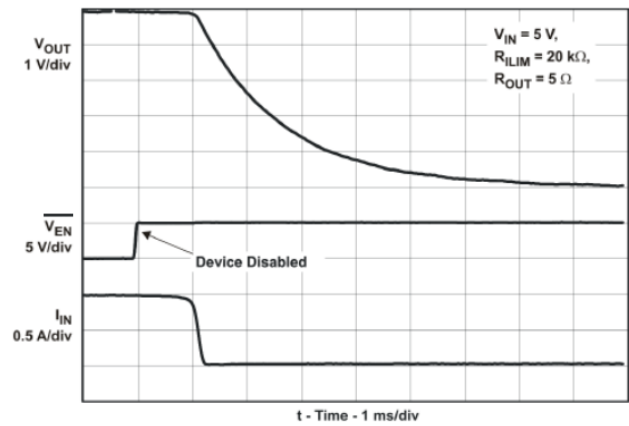
## TYPICAL PERFORMANCE CHARACTERISTICS

Tested under  $T_A=25^\circ\text{C}$ , unless otherwise specified

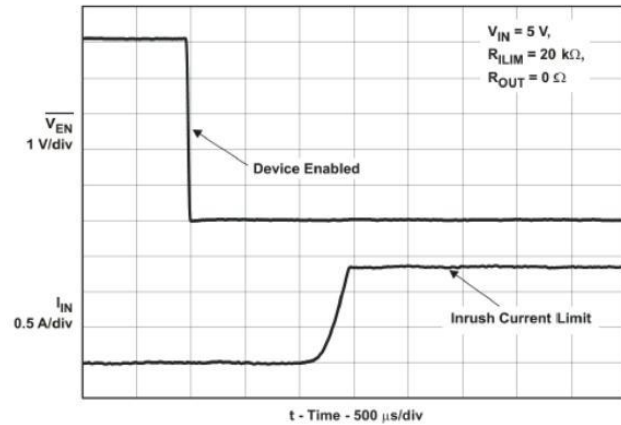
### 1. Turn On Delay and Rise Time



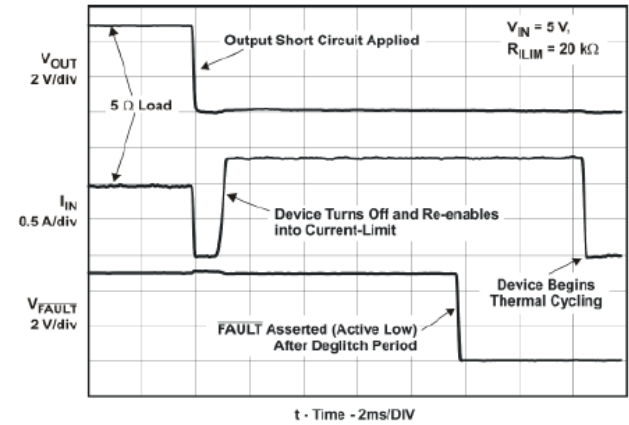
### 2. Turn Off Delay and Fall Time



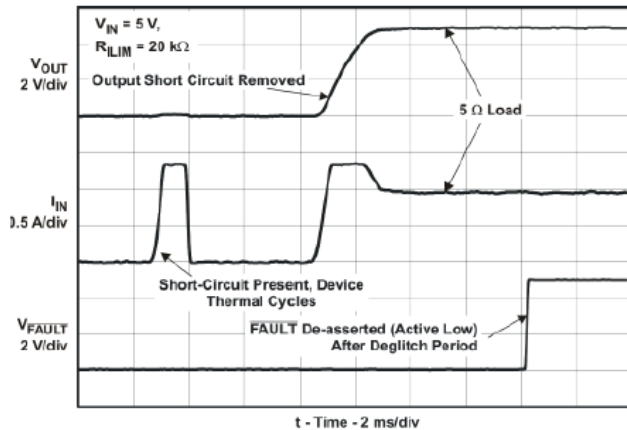
### 3. Device Enabled Into Short Circuit



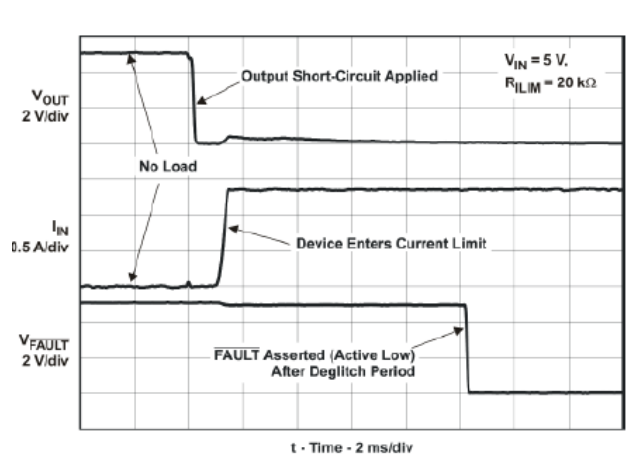
### 4. Full Load To Short Circuit Transient Response



### 5. Short Circuit To Full Load Recovery Response

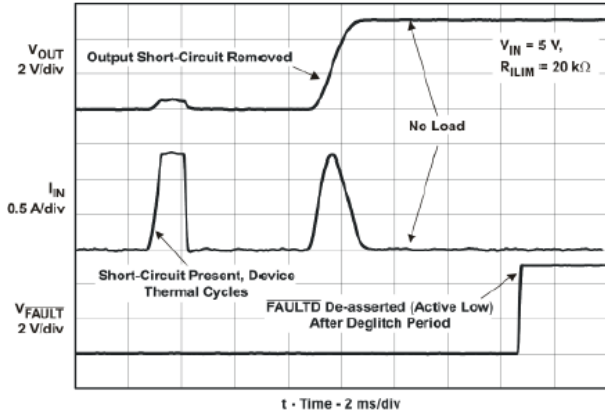


### 6. No Load To Short Circuit Transient Response

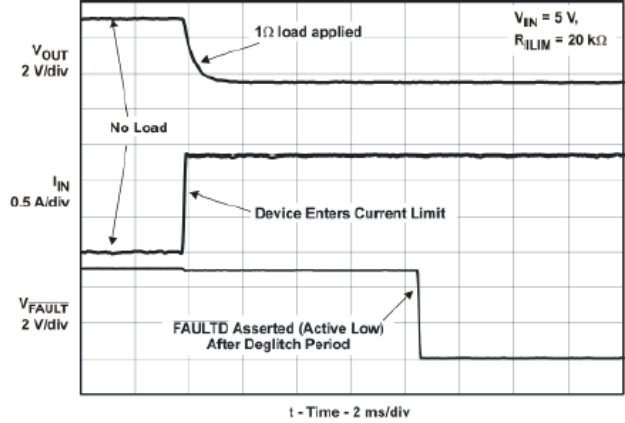




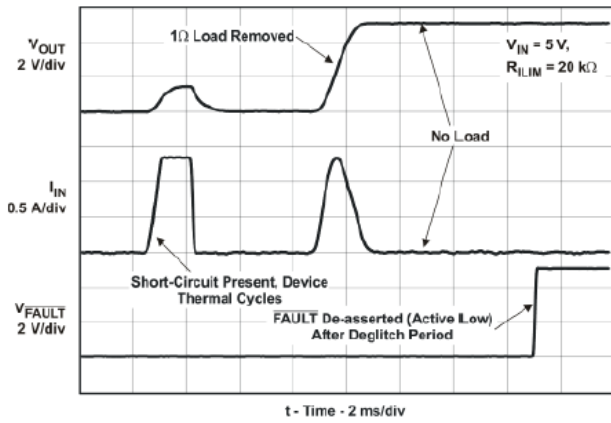
7. Short Circuit To No Load Recovery Response



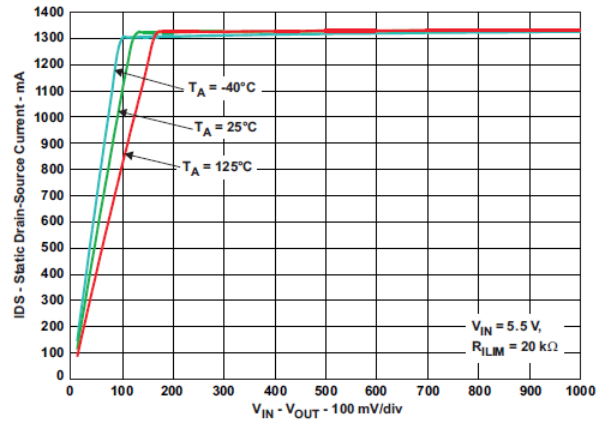
8. No Load to 1Ω Transient Response



9. 1Ω to No Load Transient Response

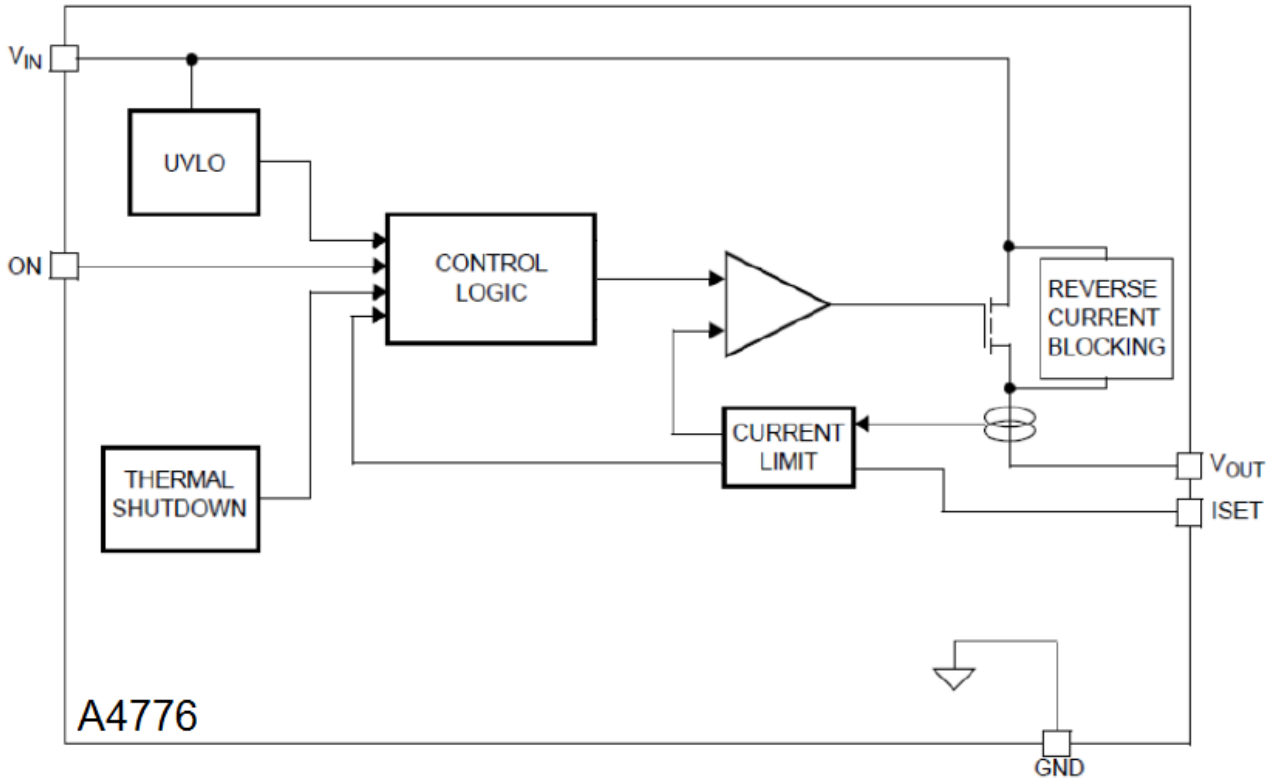


10. Switch Current vs. Dropout Voltage





**BLOCK DIAGRAM**





## DETAILED INFORMATION

### Operation

The A4776 is a current limited switch that protects systems and loads which can be damaged or disrupted by the application of high currents. The core of each device is a 0.10Ω P-channel MOSFET and a controller capable of functioning over a wide input operating range of 2.6-5.5V. The controller protects against system malfunctions through current limiting, undervoltage lockout and thermal shutdown. The current limit is adjustable from 0.15A to 1.5A through the selection of an external resistor.

### On/Off control

The ON pin controls the state of the switch. When ON is high, the switch is in the on state. Activating ON continuously holds the switch in the on state so long as there is no fault. An undervoltage on  $V_{IN}$  or a junction temperature in excess of 155°C overrides the ON control to turn off the switch. The A4776 does not turn off in response to an over current condition but instead remains operating in a constant current mode so long as ON is active and the thermal shutdown or undervoltage lockout have not activated. The ON pin control voltage and  $V_{IN}$  pin have independent and recommended operating ranges. The ON pin voltage can be driven by a voltage level higher than the input voltage.

### Current limiting

The current limit ensures that the current through the switch doesn't exceed a maximum value while not limiting at less than a minimum value. The current at which the parts will limit is adjustable through the selection of an external resistor connected to ISET. Information for selecting the resistor is found in the Application Info section. The A4776 has no current limit blanking period so it will remain in a constant current state until the ON pin is deactivated or the thermal shutdown turns-off the switch.

### Thermal Shutdown

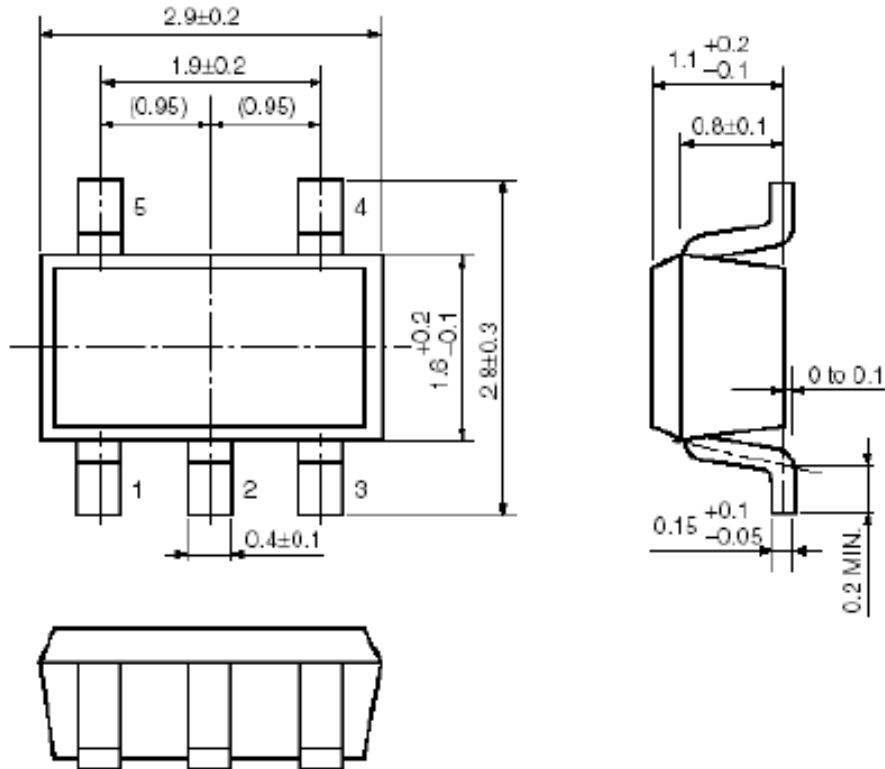
The thermal shutdown protects the die from internally or externally generated excessive temperatures. During an over-temperature condition the switch is turned-off. The switch automatically turns-on again if temperature of the die drops below the threshold temperature.





## PACKAGE INFORMATION

Dimension in SOT-25 (Unit: mm)





## IMPORTANT NOTICE

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