



# LC3455

## Adjustable USB Load Current Switch

### DESCRIPTION

The LC3455 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 120 $\mu$ 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 part is available in SOT23-5 package.

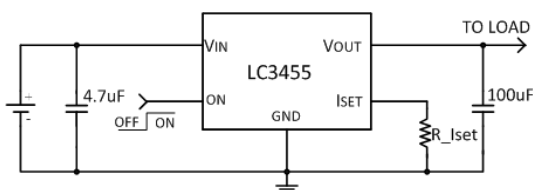
### FEATURES

- 2.5 to 5.5V input voltage range
- Controlled turn-on
- 0.15-1.5A adjustable current limit
- +/-6% current limit accuracy
- 0.1ohm on resistance
- Fast current limit response time
- Logic Control Shutdown (IQ<1uA)
- Thermal shutdown and UVLO
- Reverse current blocking
- SOT23-5 package

### APPLICATIONS

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

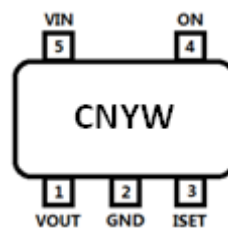
### TYPICAL APPLICATION



### ORDERING INFORMATION

Part No.	Package	Tape & Reel
LC3455CB5TR	SOT23-5	3000/Reel

### PIN OUT & MARKING



SOT23-5

**Notice:** YW means the year and week parts being manufactured, subjected to change. CN is the code of the product, it will not be changed on any part.

## ABSOLUTE MAXIMUM RATING

Parameter		Value
Max Input Voltage		6V
Max Operating Junction Temperature(Tj)		125°C
Ambient Temperature(Ta)		-40°C – 85°C
Maximum Power Dissipation	SOT23-5	250mW
Storage Temperature(Ts)		-40°C - 150°C
Lead Temperature & Time		260°C, 10S
ESD (HBM)		>4000V

Note: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

## RECOMMENDED WORK CONDITIONS

Parameter		Value
Input Voltage Range		Max. 5.5V
Operating Junction Temperature(Tj)		-20°C –125°C

## ELECTRICAL CHARACTERISTICS

(VDD=5V, T<sub>A</sub>=25°C)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
VDD	Input Voltage Range		2.6		5.5	V
Iq	Quiescent Current	Active, Vfb=0.65, No Switching		115	200	uA
		Shutdown			1	uA
Rdson	Switch Rdson	Iout=500mA		100	150	mohm
Ilimit	Adjustable current limit	R_isset=53K ohm R_isset=25K ohm R_isset=17K ohm		0.5 1.0 1.5		A
Irevlk	Reverse Voltage Leakage Current	Vout=5V, Vin=0V		0.1	5	uA
Vh_on	ON Input High Voltage		1.5			V
VI_on	ON Input Low Voltage				0.4	V
I_flagb	Flagb sink current	When Flagb activated, V_flagb=0.1V	1			mA
I_flagb_lk	Flagb leak current	When Flagb not activated,			1	uA
Tsd	Thermal shutdown Temp.			155		°C

## SETTING THE CURRENT LIMIT THRESHOLD

RILIM (KΩ)	Typical Current Limit (mA)	RILIM (KΩ)	Typical Current Limit (mA)
200	138	51	520
180	152	43	612
151	179	30	873
100	266	20	1295
82	324	15.1	1705
68	389		

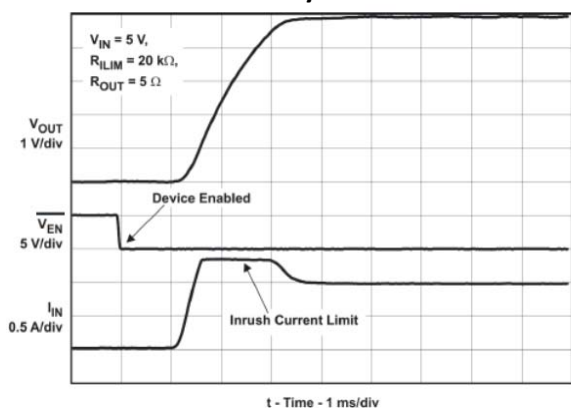
## PIN DESCRIPTION

PIN #	NAME	DESCRIPTION
1	Vout	Switch Output, the output of power switch
2	GND	Ground
3	Iset	Current limit setting pin. Connecting a resistor (R_Iset) from this pin to ground will adjust the current limit
4	On	Control input, enable pin, active high
5	Vin	Supply input voltage

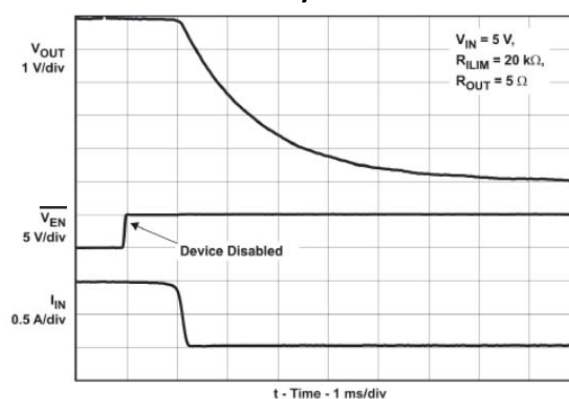
## ELECTRICAL PERFORMANCE

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

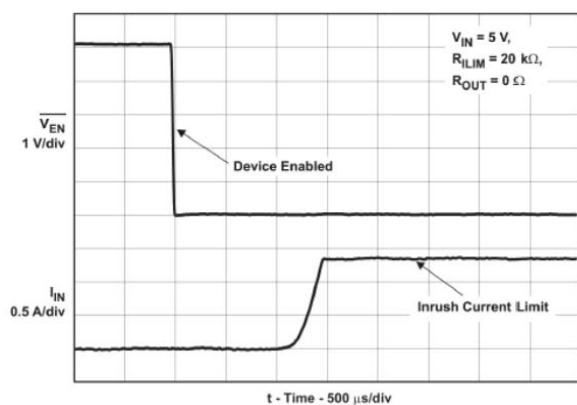
Turn on delay and rise time



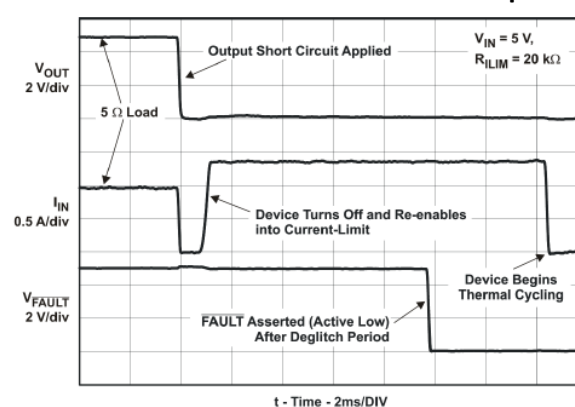
Turn off delay and fall time



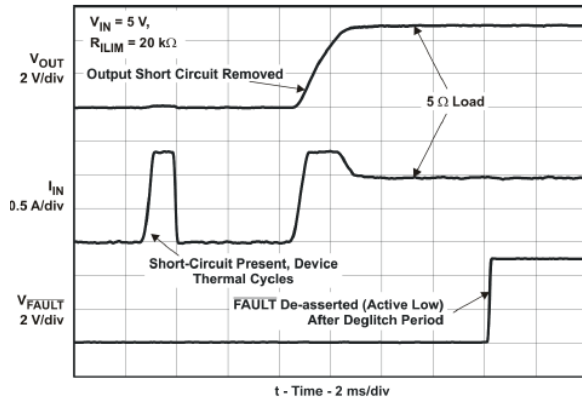
Device enabled into short circuit



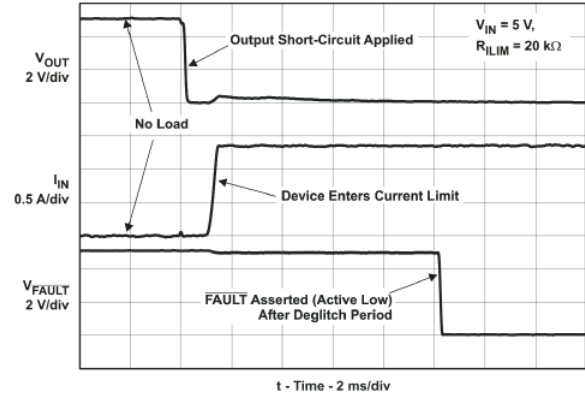
Full load to short circuit transient response



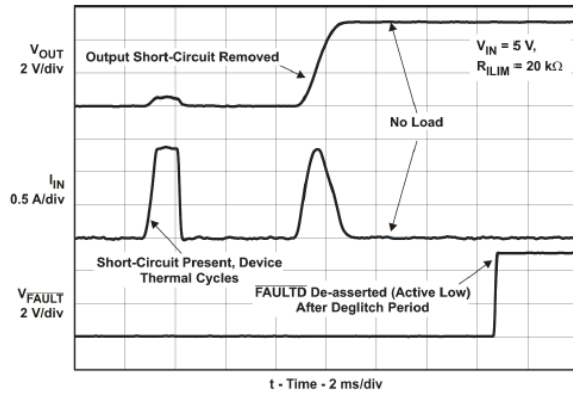
## Short circuit to full load recovery response



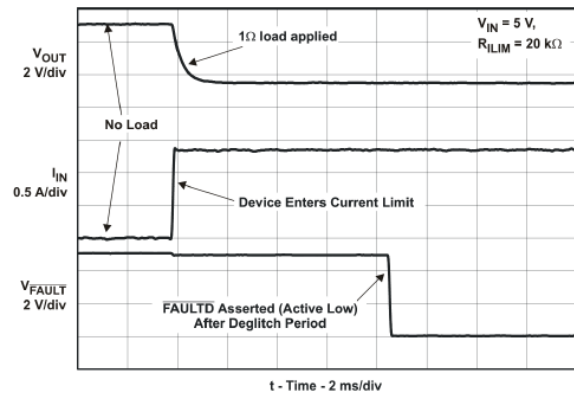
## No load to short circuit transient response



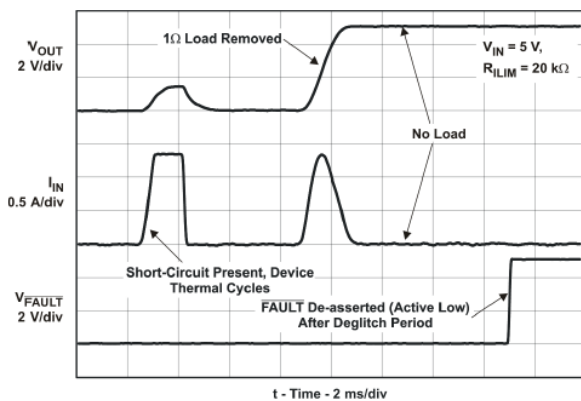
## Short circuit to no load recovery response



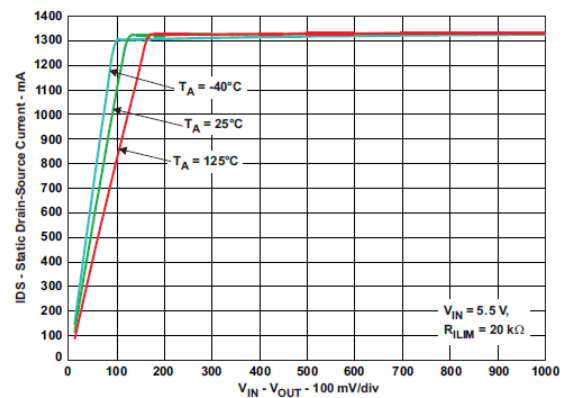
## No load to 1Ω transient response



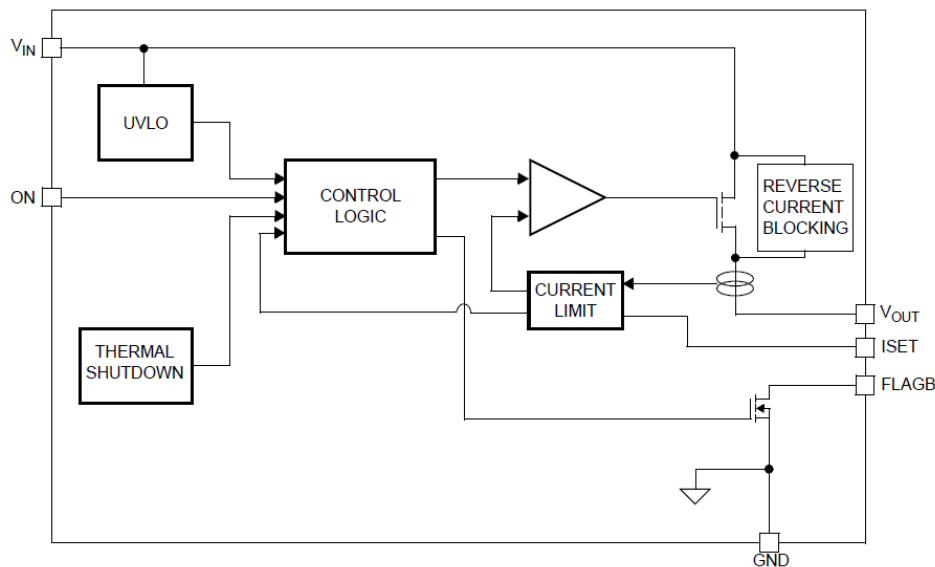
## 1Ω to no load transient response



## Switch current Vs. dropout voltage



## BLOCK DIAGRAM



## DETAILED DESCRIPTION

### Operation

The LC3455 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 VIN or a junction temperature in excess of 155°C overrides the ON control to turn off the switch. The LC3455 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 VIN pin have independent and recommended operating ranges. The ON pin voltage can be driven by a voltage level higher than the input voltage.

### Fault reporting

Upon the detection of an over-current, an input under-voltage, or an over-temperature condition, the FLAGB signals the fault mode by activating LO. With the LC3455, FLAGB is LO during the faults and immediately returns HI at the end of the fault condition. FLAGB is an open-drain MOSFET which requires a pull-up resistor between VIN and FLAGB. During shutdown, the pull-down on FLAGB is disabled to reduce current draw from the supply.

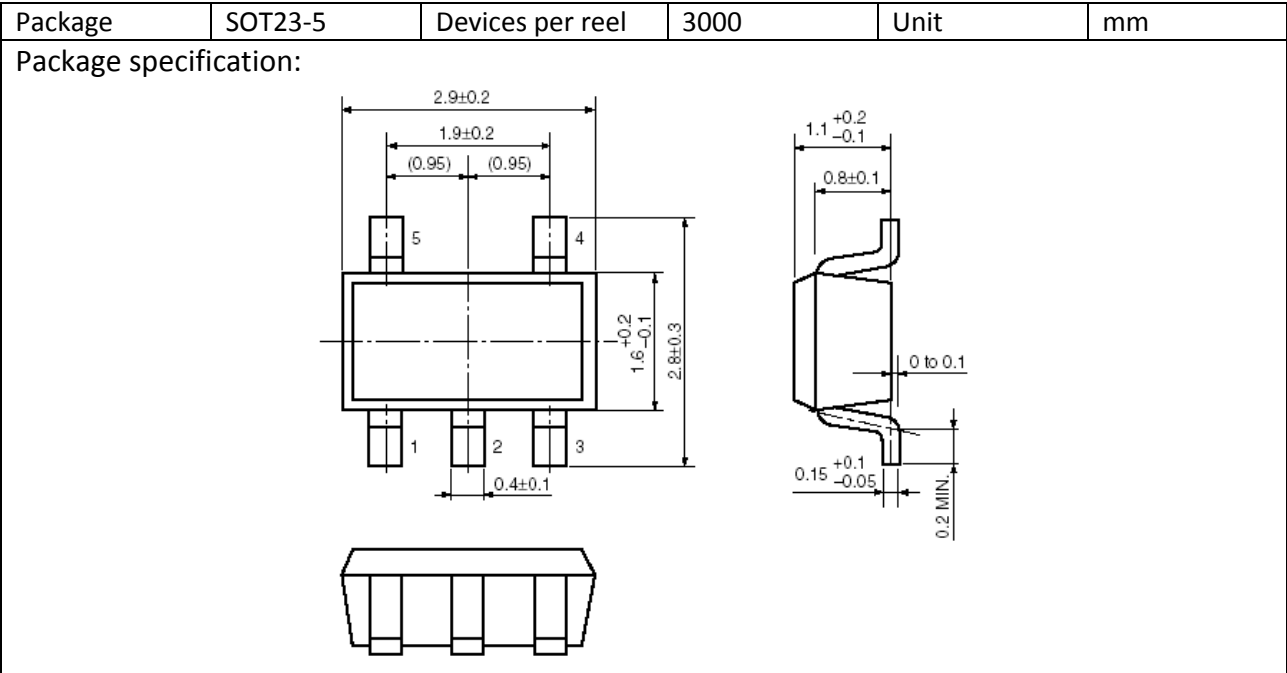
### Current limiting

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 LC3455 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 FLAGB is activated and the switch is turned-off. The switch automatically turns-on again if temperature of the die drops below the threshold temperature.

PACKAGE OUTLINE



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