

# BL8598

## Adjustable Overvoltage Protector with High Accuracy

### DESCRIPTION

The BL8598 overvoltage protection devices feature a low 180 mΩ (typ) RON internal FET and safeguards 2.2V to 28V systems from power supply overvoltage. If the input voltage exceeds the overvoltage threshold, the internal FET is turned off to prevent the output load circuits from damage.

The overvoltage protection threshold can be adjusted with optional external resistors to any voltage between 4V and 8V. With the OVLO input set below the external OVLO select voltage, the BL8598 automatically choose the internal ±2.5% accurate trip thresholds. The internal overvoltage thresholds (OVLO) are preset to 6.75V typical. The BL8598 includes an internal thermal shutdown circuit which can protect against overcurrent events.

BL8598 is available in DFN2x2-8L package.

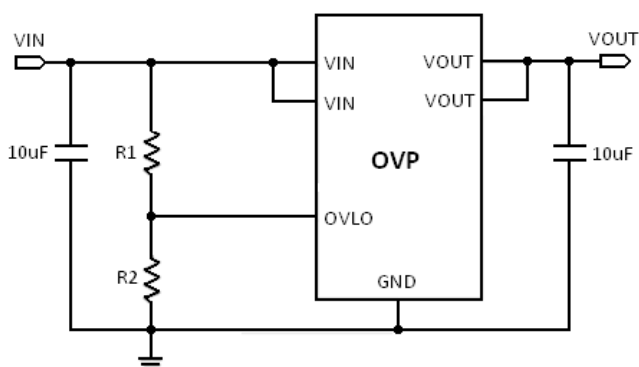
### FEATURES

- Overvoltage Protection up to 28V
- ±2.5% Accurate 6.75V OVLO Threshold
- Adjustable Overvoltage Protection Trip Level
- Integrated 180mΩ n-Channel MOSFET Switch
- Automatic Overvoltage Protection Trip-Level Selection
- Internal 15ms Startup Delay
- Thermal Shutdown Protection
- Available in DFN2x2-8L Package
- Temperature Range: -40°C~85°C

### APPLICATIONS

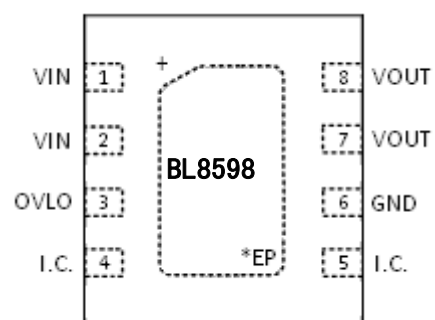
- Cell Phones
- MP3 and MP4 players
- PDAs and Palmtop Devices

### TYPICAL APPLICATION



R1 and R2 are required only for adjustable OVLO; otherwise, connect OVLO to GND.

### PIN OUT



DFN2x2-8L

\*Connect exposed PAD to GND.

## ABSOLUTE MAXIMUM RATING

Parameter	Value
Max Input Voltage	30V
V <sub>OUT</sub>	-0.3V – VIN + 0.3V
OVLO	-0.3V – 6V
Continuous VIN Current	1A
Peak VIN Current (Note 1)	5A
Continuous OVLO Current	50uA
Max Operating Junction Temperature(T <sub>J</sub> )	125°C
Ambient Temperature(T <sub>A</sub> )	-40°C – 85°C
Thermal resistance: $\theta_{JA}$	76.5°C/W
Storage Temperature(T <sub>S</sub> )	-40°C - 150°C
Lead Temperature & Time	260°C, 10S

**Note1:** Limited by thermal shutdown.

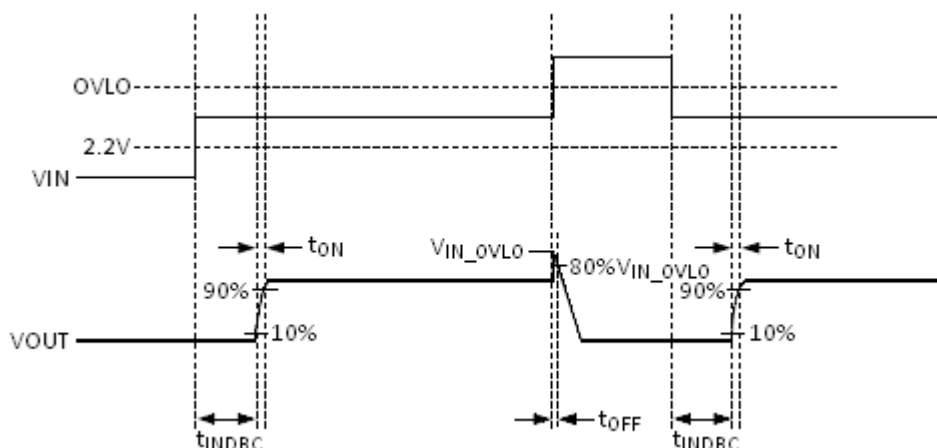
**Note2:** Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

## ELECTRICAL CHARACTERISTICS

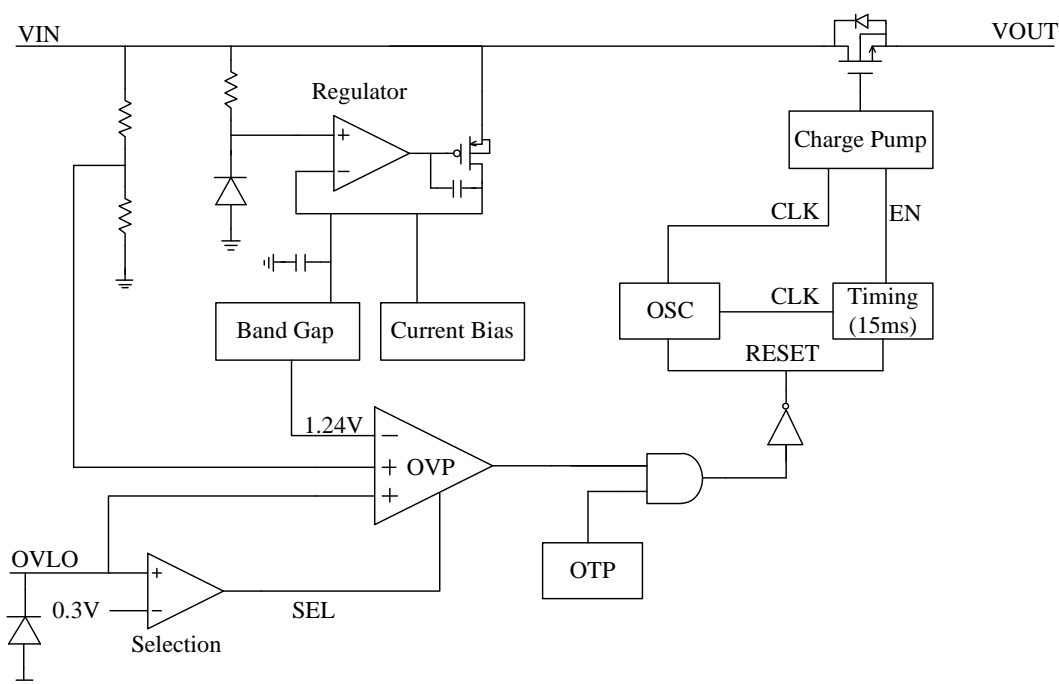
(VIN=5V, TA=25°C)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>IN</sub>	Input Voltage Range		2.2		28	V
I <sub>IN</sub>	Input Supply Current	V <sub>IN</sub> < OVLO		65		uA
I <sub>Q</sub>	Standby Current			25		uA
V <sub>IN_OVLO</sub>	Overvoltage Trip Level	V <sub>IN</sub> rising		6.75		V
V <sub>IN_OVLO_HYS</sub>	Overvoltage Hysteresis			0.8		%
V <sub>OVLO_THRESH</sub>	OVLO Set Threshold			1.24		V
V <sub>OVLO_SELECT</sub>	External OVLO Select Threshold			0.3		V
V <sub>OVLO_HYS</sub>	External OVLO Select Hysteresis			20		mV
R <sub>ON</sub>	Switch On-Resistance			180	250	mΩ
	OVLO Clamp	I <sub>CLAMP</sub> = 10uA		5.3		V
	Thermal Shutdown		145	150		°C
	Thermal Hysteresis			16		°C
t <sub>INDBC</sub>	Debounce time	Time from 1.6V < V <sub>IN</sub> < V <sub>IN_OVLO</sub> to V <sub>OUT</sub> = 10% of V <sub>IN</sub>		15		ms
t <sub>ON</sub>	Switch Turn-On Time	1.6V < V <sub>IN</sub> < V <sub>IN_OVLO</sub> , R <sub>LOAD</sub> = 100Ω, C <sub>LOAD</sub> = 100uF; V <sub>OUT</sub> from 10% to 90% of V <sub>IN</sub>		0.5		ms
t <sub>OFF</sub>	Switch Turn-Off Time	V <sub>IN</sub> > V <sub>OVLO_THRESH</sub> to V <sub>OUT</sub> = 80% of V <sub>IN_OVLO</sub> ; R <sub>LOAD</sub> = 1KΩ, V <sub>IN</sub> rising at 2V/100ns		1.7		us

## TIMING DIAGRAM



## FUNCTION DIAGRAM



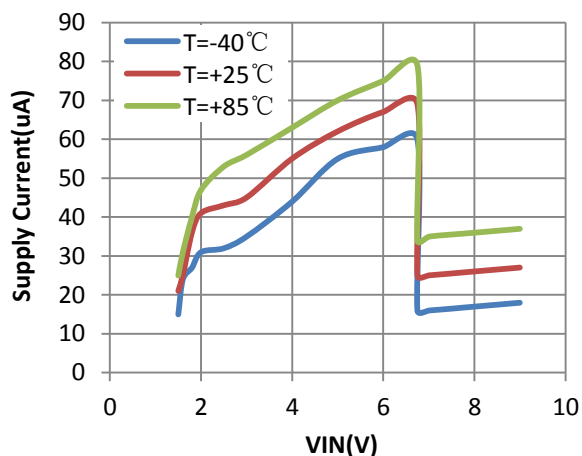
## PIN DESCRIPTION

PIN	NAME	DESCRIPTION
1, 2	VIN	Supply voltage. Connect 10uF capacitor from VIN to GND. Connect all the VIN PINs together for proper operation.
3	OVLO	External OVLO Adjustment. Connect OVLO to GND when using the internal threshold. Connect a resistor-divider to OVLO to set a different OVLO threshold; this external resistor-divider is completely independent from the internal threshold.
4, 5	I.C.	Internally connected. Don't connect. Leave I.C. unconnected.
6	GND	Ground
7, 8	VOUT	Output voltage. Connect all the VOUT PINs together for proper operation.
—	EP	Exposed pad. Connect exposed pad to ground. For enhanced thermal dissipation, connect EP to a copper area as large as possible. Don't use EP as a sole ground connect.

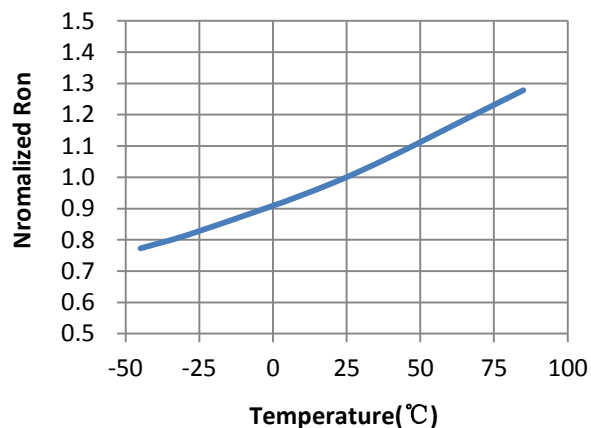
## TYPICAL PERFORMANCE CHARACTERISTICS

TA=25°C unless specified.

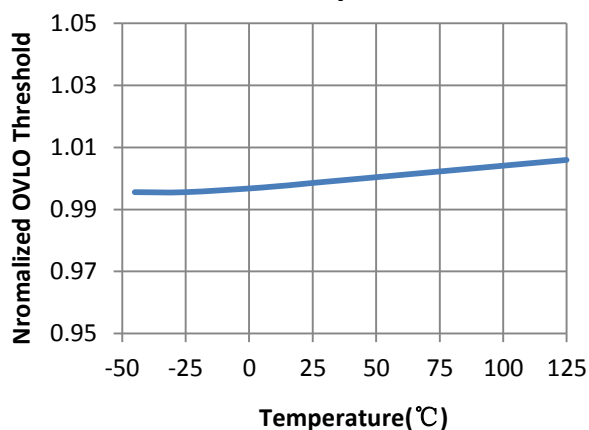
### Supply Current vs. VIN



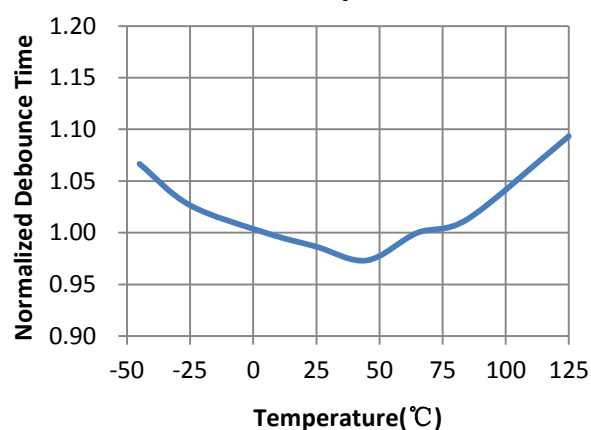
### Normalized Ron vs. Temperature



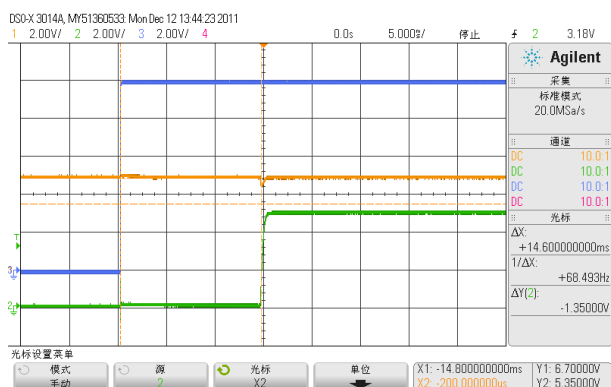
### Normalized OVLO Threshold vs. Temperature



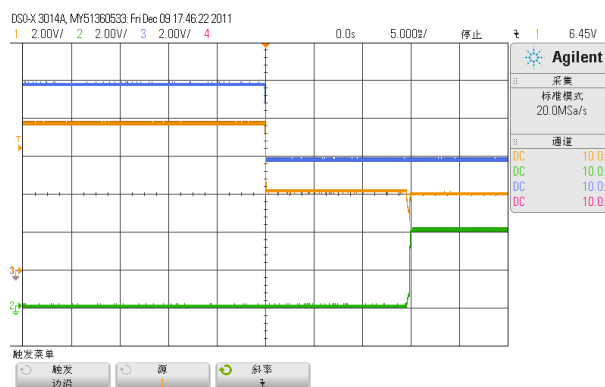
### Normalized Debounce Time vs. Temperature



### Power-Up Response



### Overvoltage Rework Response



## DETAILED DESCRIPTION

BL8598 overvoltage protection devices feature a low 180 mΩ (typ) RON internal FET and safeguards 2.2V to 28V systems from power supply overvoltage. If the input voltage exceeds the overvoltage threshold, the internal FET is turned off to prevent the output load circuits from damage. The 15ms debounce time guarantees proper turn on of the internal FET during startup.

### **Device Operation**

On initial power up, if  $V_{IN} > V_{OVLO\_THRESH}$ ,  $V_{OUT}$  is disconnected from  $V_{IN}$ . If  $V_{IN} < V_{OVLO\_THRESH}$ , the internal charge pump is enabled, the device enters startup after a 15ms debounce delay.

### **Internal Switch**

BL8598 incorporate an internal FET with a 180 mΩ RON. The FET is internally driven by a charge pump that generates a necessary gate voltage above  $V_{IN}$ . The internal FET is capable of passing more than 5A inrush current.

### **Overvoltage Lockout(OVLO)**

BL8598 has a 6.75V OVLO threshold.

### **Thermal Shutdown Protection**

BL8598 has a thermal shutdown circuitry to turn off the internal FET when the junction temperature exceeds 150°C. The FET will recover automatically when the junction temperature falls by 16°C.

## APPLICATION INFORMATION

### **VIN Bypass Capacitor**

A 10uF ceramic capacitor is typically recommended for CIN. CIN should be located as close to the device VIN pin as practically possible. If the power source has significant inductance due to long lead length, take care to prevent overshoots due to the LC tank circuit and provide protection if necessary to prevent exceeding the +30V absolute maximum rating on VIN.

### **Output Capacitor**

A 10uF output capacitor is required at the output.

### **External OVLO Adjustment Functionality**

If OVLO is connected to ground, the internal OVLO comparator uses the internally set OVLO value. If OVLO is connected to the external resistor divider, and  $V_{OVLO}$  exceeds the OVLO select voltage,  $V_{OVLO\_SELECT}$ , the internal OVLO comparator is programmed with two resistors, R1 and R2. A suggested value for R1 is 1MΩ for minimum current consumption. In the case of  $R1 = 1M\Omega$  and since  $V_{IN\_OVLO}$ ,  $V_{OVLO\_THRESH}$ , R2 can be approximated by the following formula:

$$V_{IN\_OVLO} = V_{OVLO\_THRESH} \times \left[ 1 + \frac{R1}{R2} \right]$$

This external resistor divider is completely independent from the internal resistor divider.

## PACKAGE OUTLINE

