# 50V Over-Voltage-Protector with 43mohm On Resistance

## DESCRIPTION

ETA70084 is a 50V low side Over-Voltage-Protection (OVP) IC with only 43mohm switch resistance. It employs a low side protection topology which ensure a very low on resistance together with a high protection voltage.

ETA70084 is consist of a voltage comparator, a switch driver and a 43mohm power NMOS.

ETA70084 is available in DFN2x2-6 package.

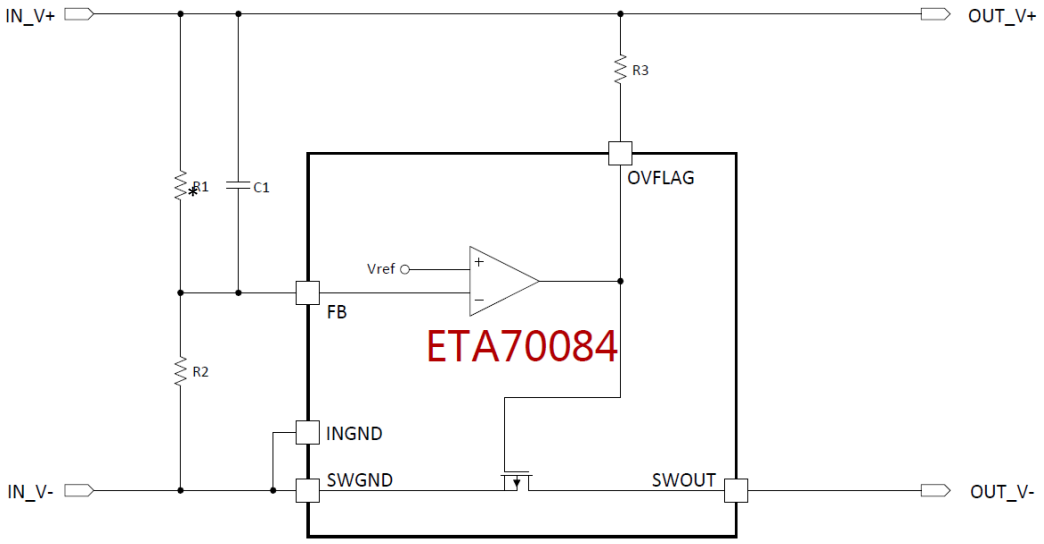
## FEATURES

- Over voltage protection up to 50V
- 43mohm switch resistance
- Protection voltage adjustable
- Switch on speed adjustable

## APPLICATIONS

- Tablet, MID
- Smart Phone
- Car camera
- Power bank

## TYPICAL APPLICATION

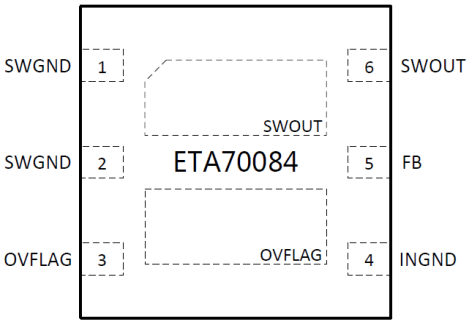



** R1 can be replaced by a Zener Diode*

## ORDERING INFORMATION

| PART No. | PACKAGE | TOP MARK | Pcs/Reel |
|---|---|---|---|
| ETA70084D2G | DFN2x2-6 | DeYW | 3000 |

## PIN CONFIGURATION




DFN2x2-6

## ABSOLUTE MAXIMUM RATINGS

(Note: Exceeding these limits may damage the device. Exposure to absolute maximum rating conditions for long periods may affect device reliability.)

FB Pin .....–0.3V to 0.7V, internally clamped
OVFLAG Pin .....12V
SWOUT Pin .....50V
Operating Temperature Range .....–40°C to 85°
Storage Temperature Range .....–55°C to 150°C

| Thermal Resistance | $\theta_{JC}$ | $\theta_{JA}$ |
|---|---|---|
| DFN2x2-6 | 45 | 165 °C /W |

Lead Temperature (Soldering, 10ssec) .....260°C
ESD HBM (Human Body Mode) .....2KV
ESD MM (Machine Mode) .....200V

## PIN DESCRIPTION

| DFN2x2-6 PIN # | NAME | DESCRIPTION |
|---|---|---|
| 1, 2 | SWGND | The power ground |
| 3 | OVFLAG | Connecting a resistor to VIN, turns low when protection triggered |
| 4 | INGND | The analog ground |
| 5 | FB | Reference voltage pin for setting OVP trigger voltage |
| 6 | SWOUT | The output terminal |

## DC ELECTRICAL CHACRACTERISTICS

($V_{IN}$ = 5V, unless otherwise specified. Typical values are at TA = 25°C.)

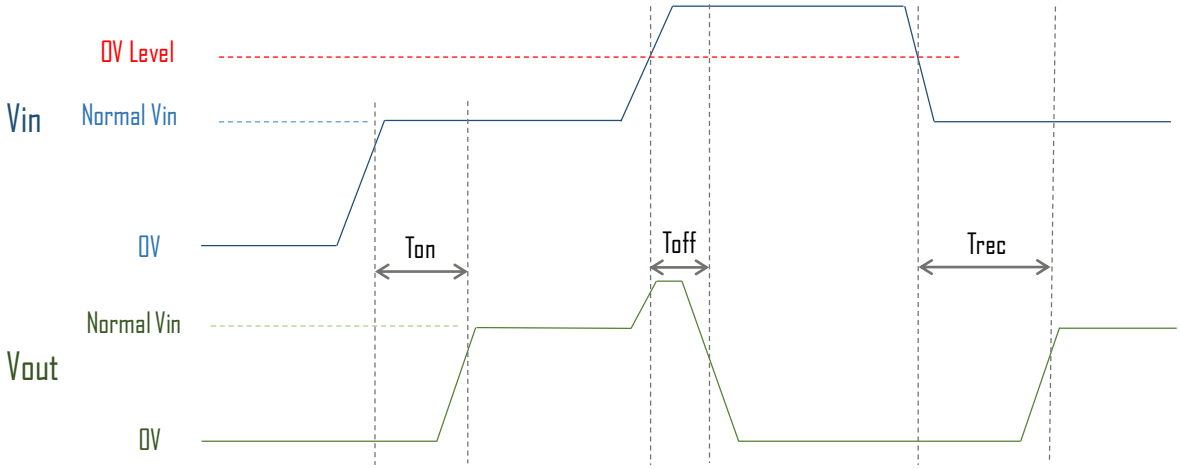
| PARAMETER | CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|
| FB voltage (Vfb) | R1 =9.1K, R2=820ohm<br>OV level = (R1+R2)/R2 * Vfb | 0.45 | 0.5 | 0.55 | V |
| Switch Rdson | Vin=5V | | 43 | 50 | mΩ |
| Switch Current | Vin=5V, Current from SWOUT to SWGND | | | 3.5 | A |
| SWOUT Leakage | Vswout = 50V, under OV protection condition | | 0.1 | 1 | mA |

## AC ELECTRICAL CHACRACTERISTICS

($V_{IN}$ = 5V, unless otherwise specified. Typical values are at TA = 25oC.)

It is very crucial for an over-voltage-protection IC to turn off the switch as soon as possible after detecting a input voltage surge that trigger the protection level. C1 is to adjust the dection and protection speed and R3 is to set the turn on speed of the protection switch.

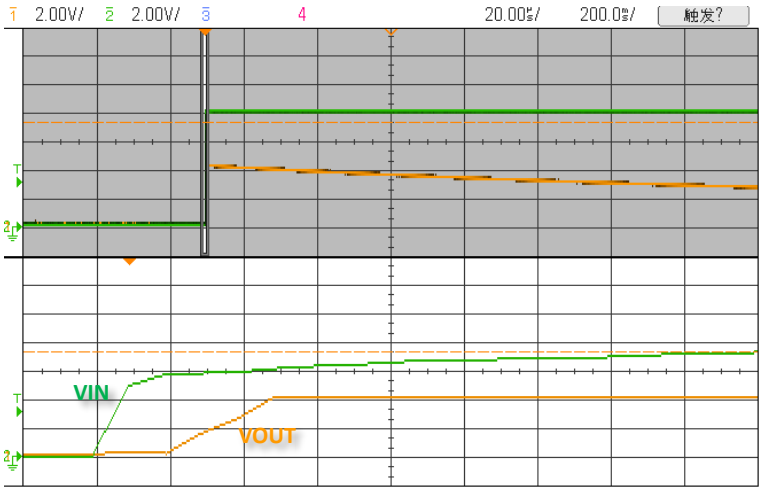
Turn on delay time (Ton), protection delay time (Toff) and output recovery time after voltage drop within Over-Voltage (OV) level (Trec) are defined as followings.



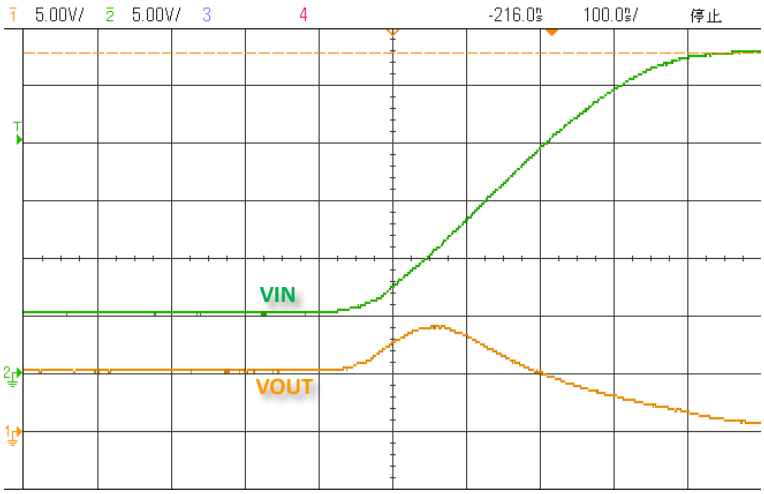

Ton : the time from 90% Vin at VIN termianl to 90% Vin at VOUT terminal
Toff: the time from OV level triggered at VIN terminal to voltage drop to 80% Vin at VOUT terminal
Trec: the time from voltage drop back to OV level at VIN terminal to voltage rise back to 90% Vin at VOUT terminal

By choosing R1=9.1K, R2=680ohm, we can set the over-voltage level at 7.2V. R3 is normally chosen to be 100K. And C1 is 1nF for a good OVP transient response. And followings are the response characteristics.

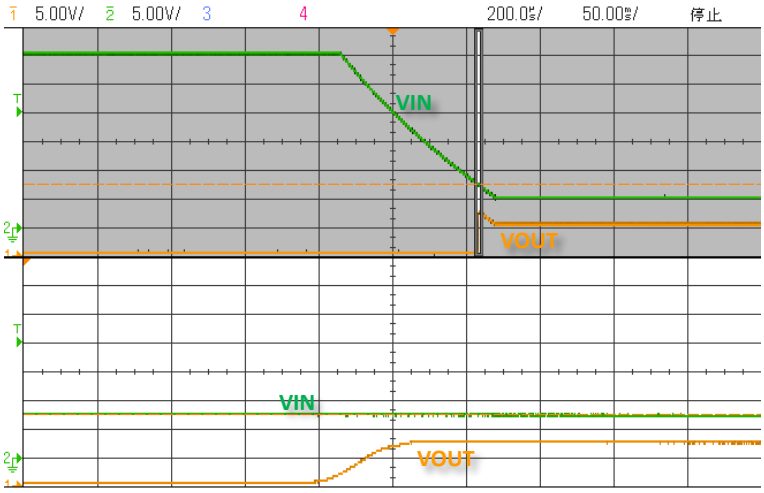
Turn on delay time
Ton = 40us



Turn off (protection) delay time
Vin step from 5V to 27V
Toff = 0.10us



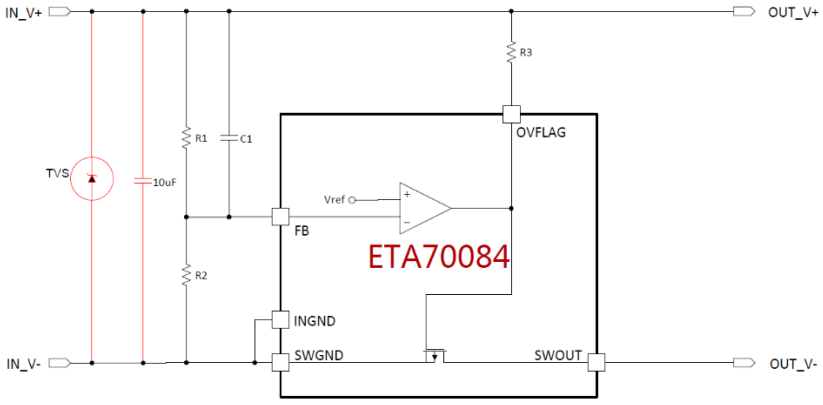

Recovery delay time
Vin drop from 30V to 5V
Trec = 250us



# APPLICATION INFORMATION

## Typical circuit for cellphone/tablet application

ETA70084 is ideal for input surge voltage protection, especially for cellphone and tablet application which is required to pass a 300-500V voltage surge test. With ETA70084's high voltage protection ability, one can use a normal low cost TVS and a 10uF to keep input surge voltage within 50V.



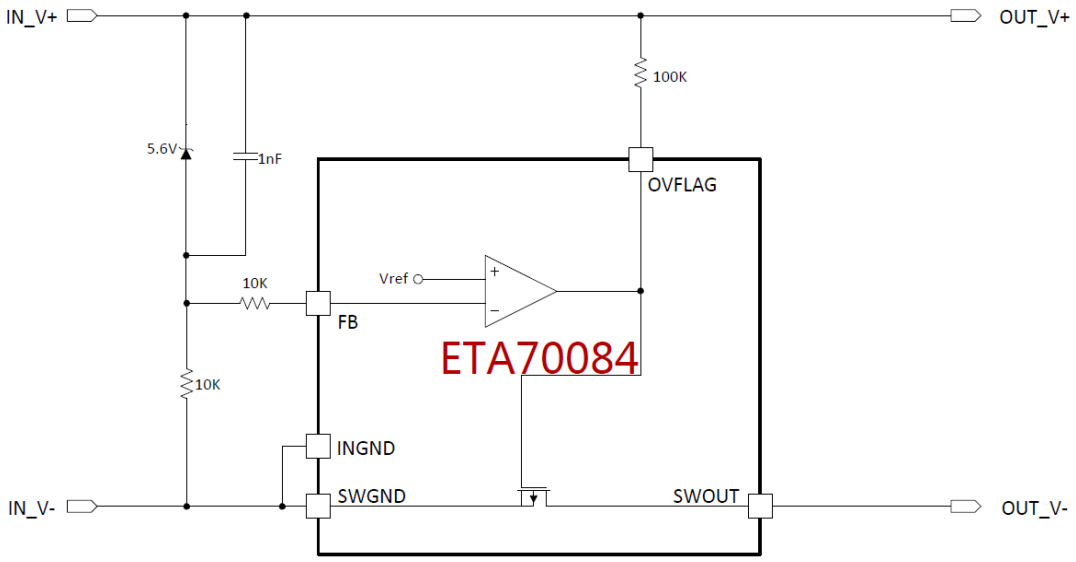

The circuit on the left shows the details

## Application with OVP level defined by Zener Diode

When a low and accurate OVP level is needed, for instance, 6.1V OVP for some input voltage sensitive system, a small and cheap zener diode is suggested to replace the R1 in the typical application circuit.

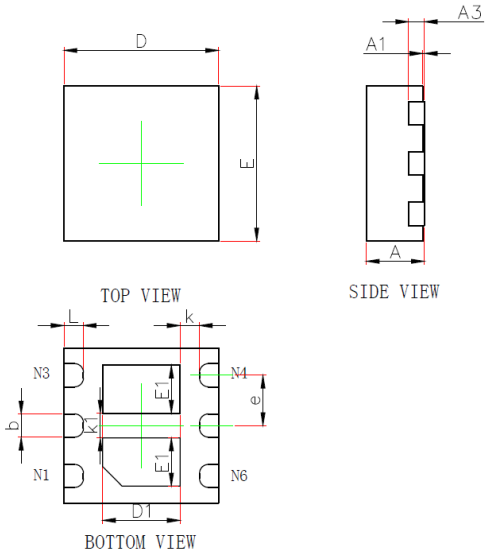
The OVP level then becomes the Vzener + Vfb, and if a 5.6V zener diode is used, then the OVP level is 5.6V+0.5V=6.1V. Such OVP level will have a very good temperature coefficient.

A typical and proven circuit with such zener diode is shown below, and suggested for any system with an OVP slightly above 6V.



## PACKAGE OUTLINE

Package: DFN2x2-6




| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | MIN. | MAX. | MIN. | MAX. |
| A | 0.700 | 0.800 | 0.028 | 0.031 |
| A1 | 0.000 | 0.050 | 0.000 | 0.002 |
| A3 | 0.203REF. | | 0.008REF. | |
| D | 1.900 | 2.100 | 0.075 | 0.083 |
| E | 1.900 | 2.100 | 0.075 | 0.083 |
| D1 | 0.900 | 1.100 | 0.035 | 0.043 |
| E1 | 0.520 | 0.720 | 0.020 | 0.028 |
| b | 0.250 | 0.350 | 0.010 | 0.014 |
| e | 0.650TYP. | | 0.026TYP. | |
| k | 0.200MIN. | | 0.008MIN. | |
| k1 | 0.320REF | | 0.013REF. | |
| L | 0.200 | 0.300 | 0.008 | 0.012 |