

## 75V Over-Voltage-Protector with 80mohm On Resistance

### DESCRIPTION

ETA70086 is a low side Over-Voltage-Protection (OVP) IC with only 80mohm switch resistance. It employs a low side protection topology which ensure a very low on resistance together with a high protection voltage.

ETA70086 is consist of a voltage comparator, a switch driver and an 80mohm power NMOS.

ETA70086 is available in DFN2x2-6 package.

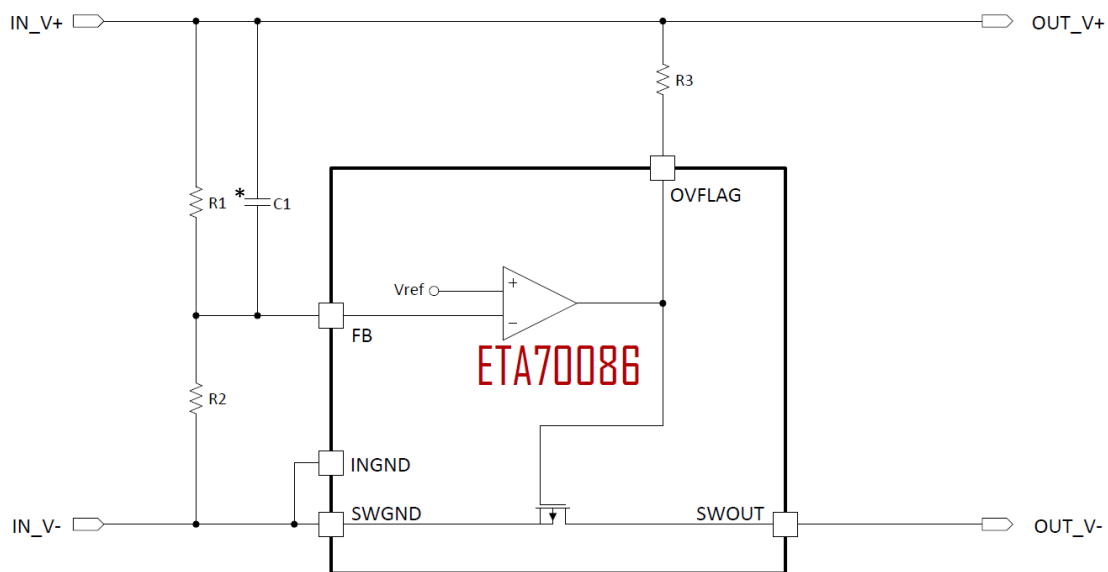
### FEATURES

- ◆ Over voltage protection up to 75V
- ◆ 80mohm switch resistance
- ◆ Protection voltage adjustable
- ◆ Switch on speed adjustable

### APPLICATIONS

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

### TYPICAL APPLICATION

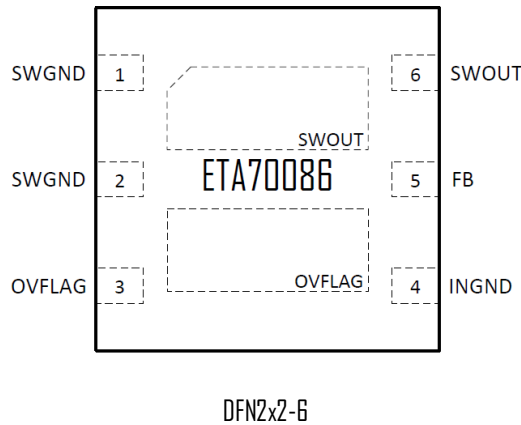


\* R1 can be replaced by a Zener Diode

### ORDERING INFORMATION

PART No.	PACKAGE	TOP MARK	Pcs/Reel
ETA70086D2G	DFN2x2-6	DtYW	3000

## PIN CONFIGURATION



## 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 .....	75V
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 CHARACTERISTICS

(VIN = 5V, unless otherwise specified. Typical values are at TA = 25°C.)

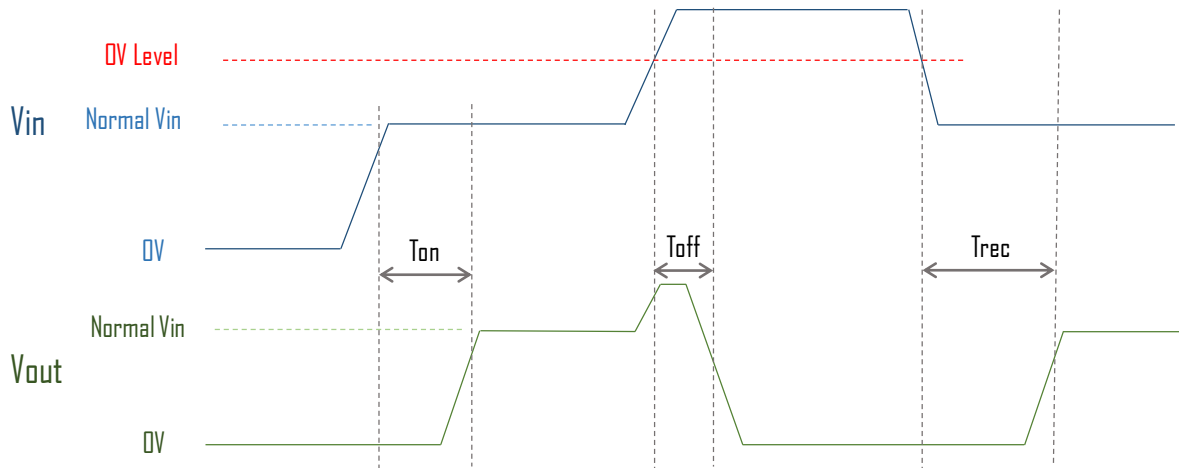
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
FB voltage (Vfb)	R1 = 9.1k, R2 = 820ohm OV level = (R1+R2)/R2 * Vfb	0.45	0.5	0.55	V
Switch Rds(on)	Vin=5V, I=1A		80	90	mΩ
Switch Current	Vin=5V, Current from SWOUT to SWGND			3	A
SWOUT Leakage	Vswout = 75V, under OV protection condition		0.1	1	mA

## AC ELECTRICAL CHARACTERISTICS

( $V_{IN} = 5V$ , unless otherwise specified. Typical values are at  $T_A = 25^{\circ}C$ .)

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 ( $T_{on}$ ), protection delay time ( $T_{off}$ ) and output recovery time after voltage drop within Over-Voltage (OV) level ( $T_{rec}$ ) are defined as followings.



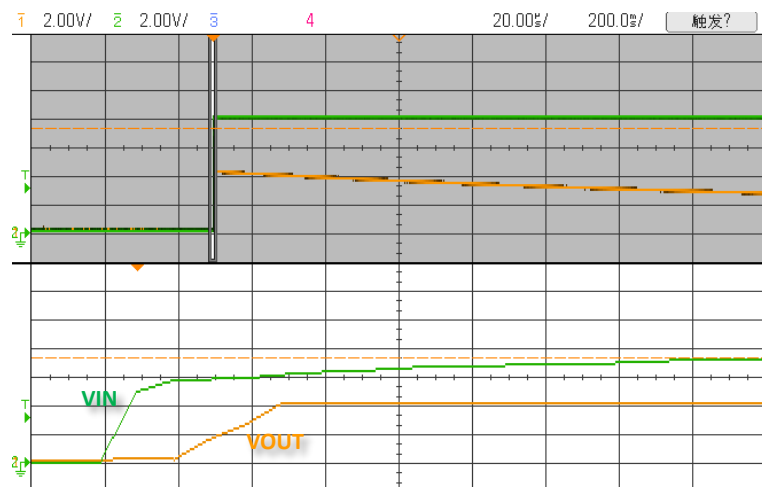
$T_{on}$  : the time from 90%  $V_{in}$  at  $V_{IN}$  terminal to 90%  $V_{in}$  at  $V_{OUT}$  terminal

$T_{off}$ : the time from OV level triggered at  $V_{IN}$  terminal to voltage drop to 80%  $V_{in}$  at  $V_{OUT}$  terminal

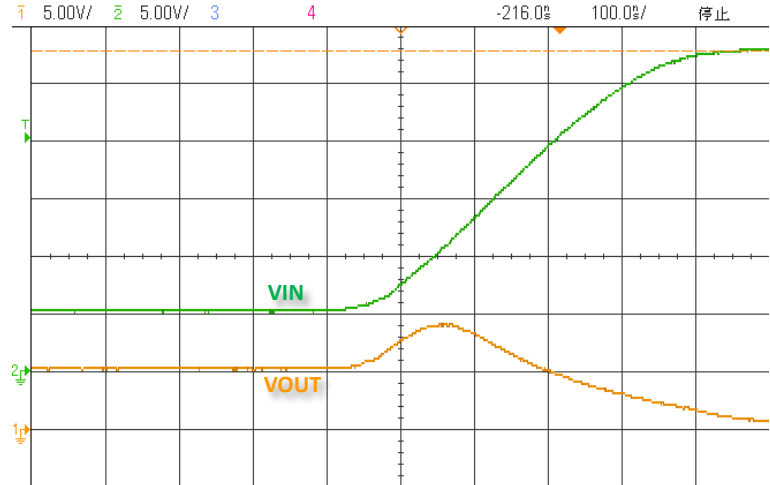
$T_{rec}$ : the time from voltage drop back to OV level at  $V_{IN}$  terminal to voltage rise back to 90%  $V_{in}$  at  $V_{OUT}$  terminal

By choosing  $R1=9.1K$ ,  $R2=680\Omega$ , 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.

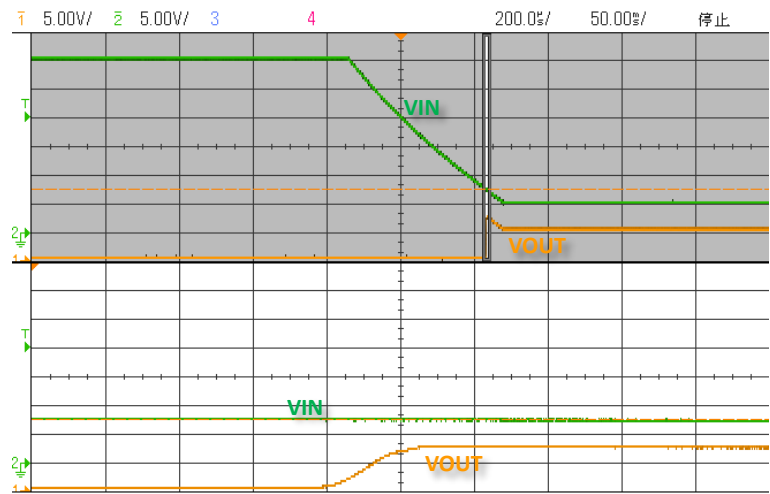
Turn on delay time  
 $T_{on} = 40\mu s$



Turn off (protection) delay time  
 Vin step from 5V to 27V  
 $T_{off} = 0.10\mu s$



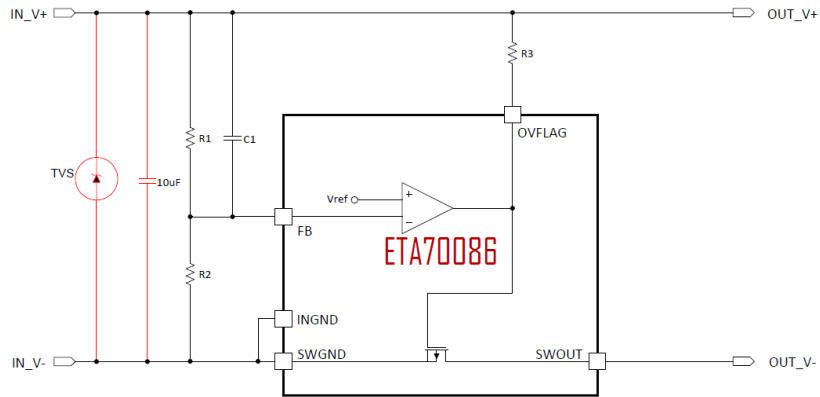
Recovery delay time  
 Vin drop from 30V to 5V  
 $T_{rec} = 250\mu s$



## APPLICATION INFORMATION

### Typical circuit for cellphone/tablet application

ETA70086 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 ETA70086's high voltage protection ability, one can use a normal low cost TVS and a 10uF to keep input surge voltage within 75V.



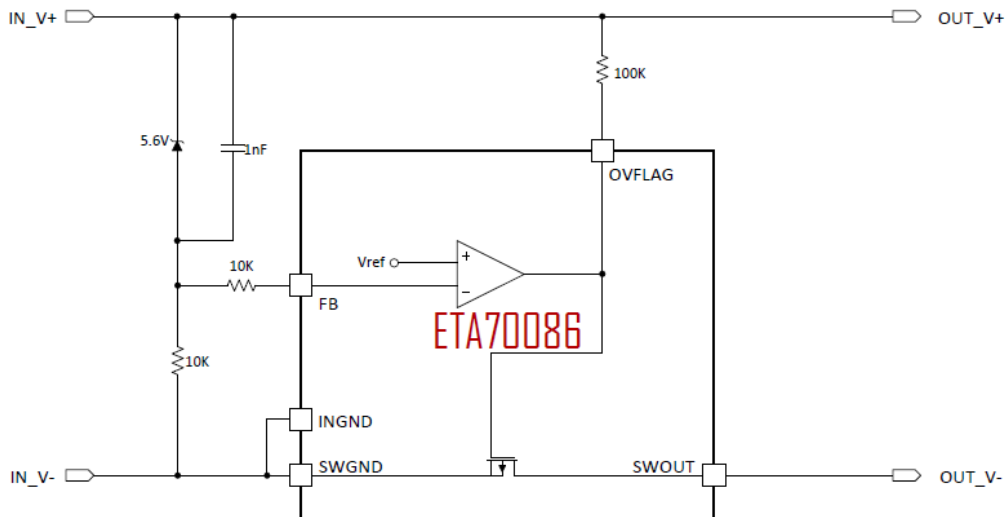
The circuit on the left shows the details

### 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.

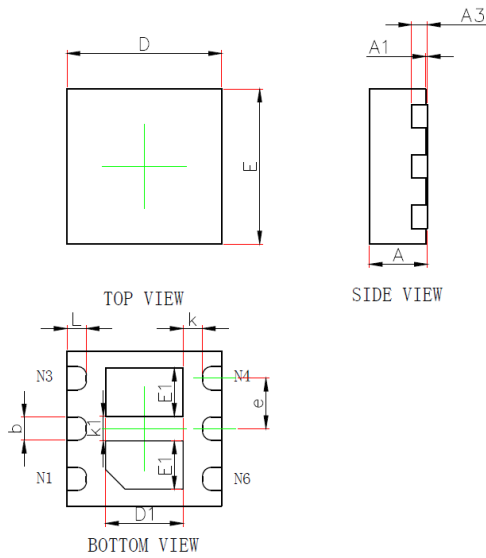
The OVP level then becomes the  $V_{zener} + V_{fb}$ , and if a 5.6V zener diode is used, then the OVP level is  $5.6V + 0.5V = 6.1V$ . Such OVP level will have a very good temperature coefficient.

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