

36V Over-Voltage-Protector with 34mohm On Resistance

DESCRIPTION

ETA7008 is a low side Over-Voltage-Protection (OVP) IC with only 34mohm switch resistance. It employs a low side protection topology which ensure a very low on resistance together with a high protection voltage.

ETA7008 is consist of a voltage comparator, a switch driver and a 34mohm power NMOS.

ETA7008 is available in both SOT23-6 and DFN2x2-6 package.

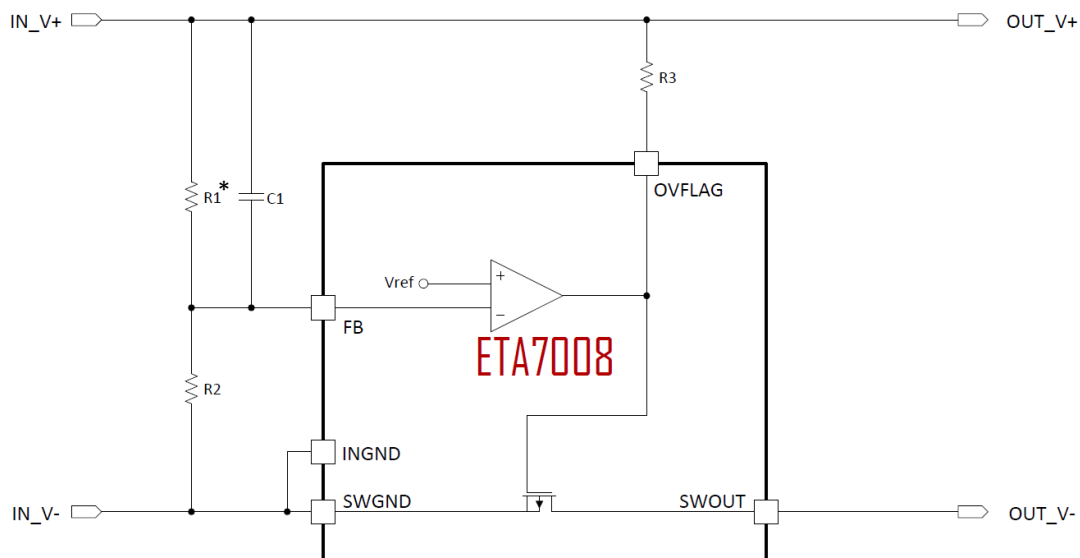
FEATURES

- ◆ Over voltage protection up to 36V
- ◆ 34mohm switch resistance
- ◆ Protection voltage adjustable
- ◆ Switch on speed adjustable

APPLICATIONS

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

TYPICAL APPLICATION

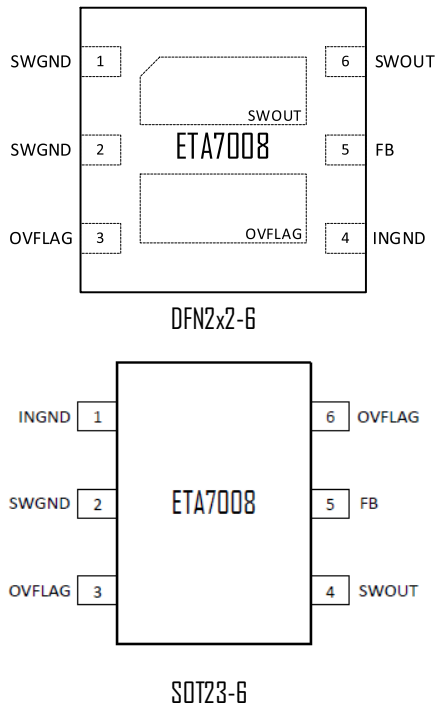


* R1 can be replaced by a Zener Diode

ORDERING INFORMATION

PART No.	PACKAGE	TOP MARK	Pcs/Reel
ETA7008D2G	DFN2x2-6	DSYW	3000
ETA7008S2G	SOT23-6	D3YW	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	36V
Operating Temperature Range	-40°C to 85°C
Storage Temperature Range	-55°C to 150°C
Thermal Resistance	θ_{JC} θ_{JA}
DFN2x2-6.....	45.....165 °C /W
SOT23-6.....	65.....195 °C /W
Lead Temperature (Soldering, 10ssec)	260°C
ESD HBM (Human Body Mode)	2KV
ESD MM (Machine Mode)	200V

PIN DESCRIPTION

DFN2x2-6 PIN #	SOT23-6 PIN #	NAME	DESCRIPTION
1, 2	2	SWGND	The power ground
3	3, 6	OVFLAG	Connecting a resistor to VIN, turns low when protection triggered
4	1	INGND	The analog ground
5	5	FB	Reference voltage pin for setting OVP trigger voltage
6	4	SWOUT	The output terminal

DC ELECTRICAL CHARACTERISTICS

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

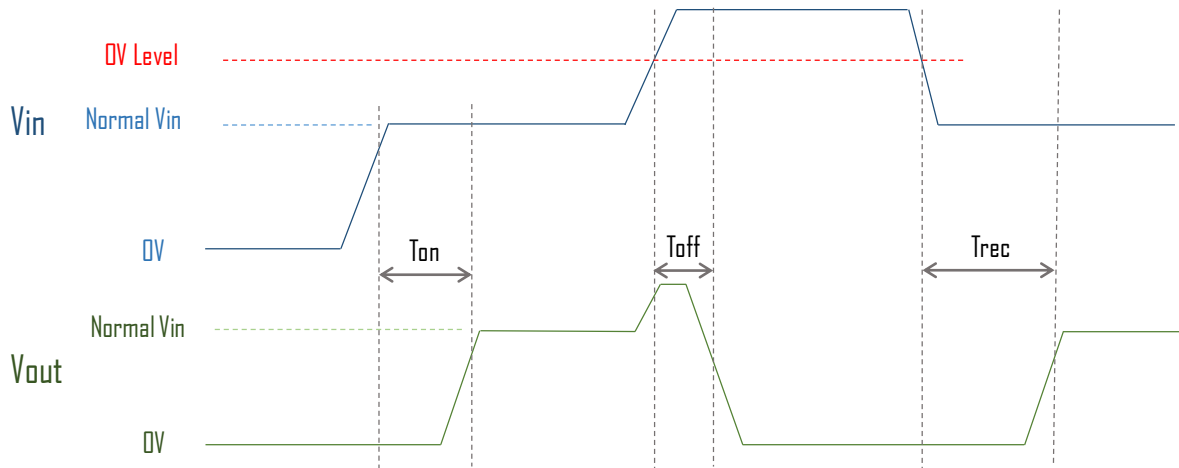
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
FB voltage (Vfb)	R1 = 9.1k, R2 = 820ohm OV level = (R1+R2)/R2 * Vfb	0.45	0.5	0.55	V
Switch Rds(on)	Vin = 5V		34	40	mΩ
Switch Current	Vin = 5V, Current from SWOUT to SWGND			4	A
SWOUT Leakage	Vswout = 36V, under OV protection condition		0.1	1	mA

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.



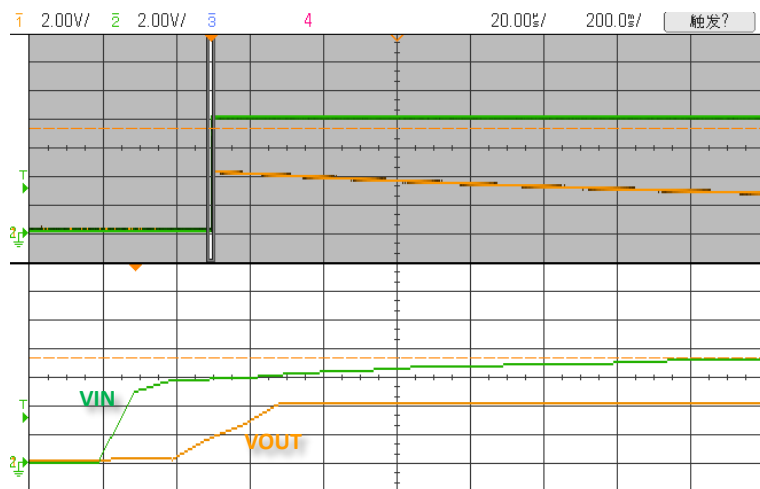
T_{on} : the time from 90% V_{in} at V_{IN} terminal to 90% V_{in} at V_{OUT} terminal

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

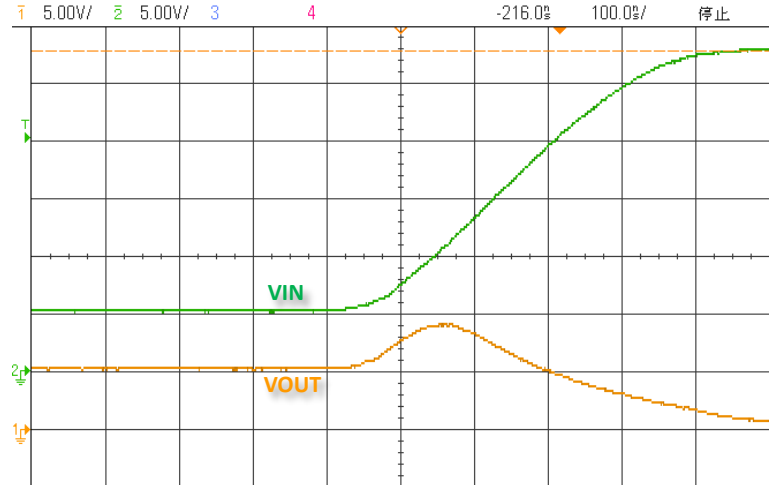
T_{rec} : the time from voltage drop back to OV level at V_{IN} terminal to voltage rise back to 90% V_{in} at V_{OUT} terminal

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.

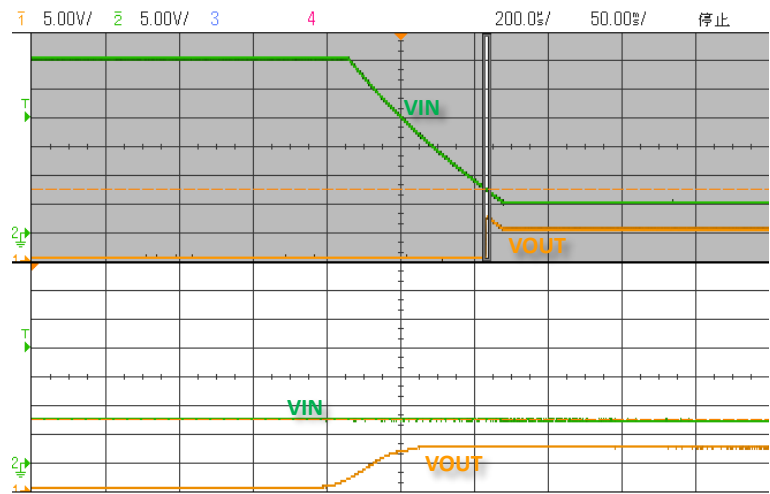
Turn on delay time
 $T_{on} = 40\mu s$



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



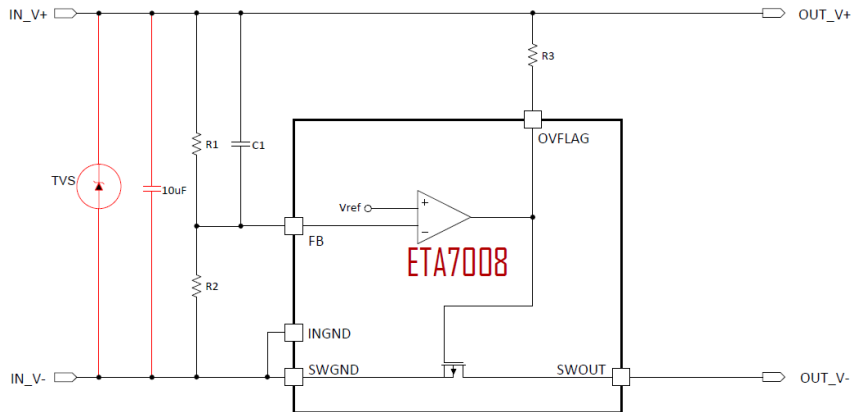
Recovery delay time
 Vin drop from 30V to 5V
 $T_{rec} = 250\mu s$



APPLICATION INFORMATION

Typical circuit for cellphone/tablet application

ETA7008 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 ETA7008's high voltage protection ability, one can use a normal low cost TVS and a 10uF to keep input surge voltage with 36V.



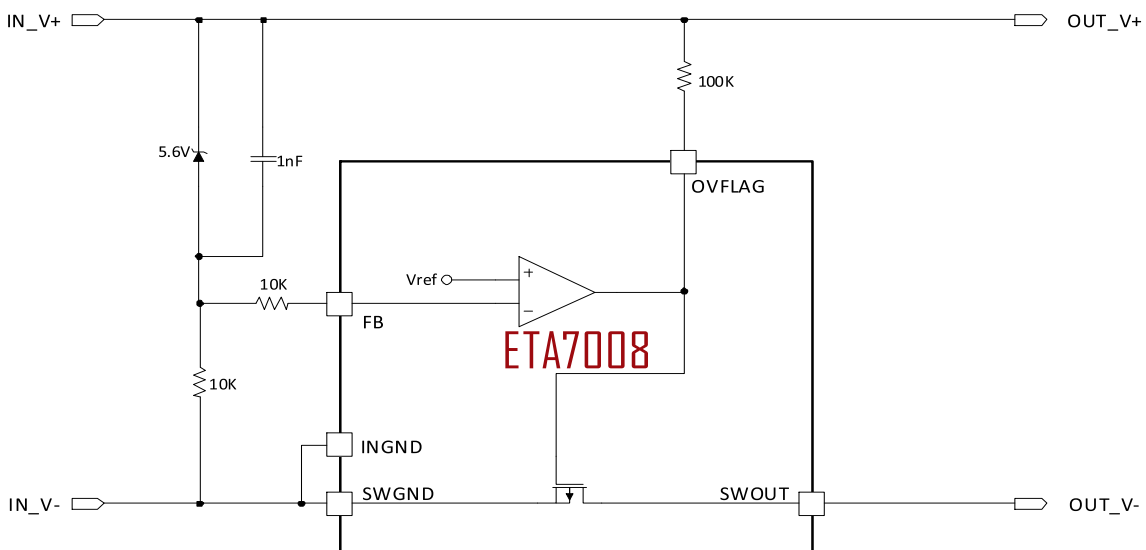
The circuit on the left shows the details

Application with OVP level defined by Zener Diode

When a low and accurate OVP level is needed, for instance, 6.4V OVP for some input voltage sensitive system, a small and cheap zener diode is suggested to replace the R1 in the typical application circuit.

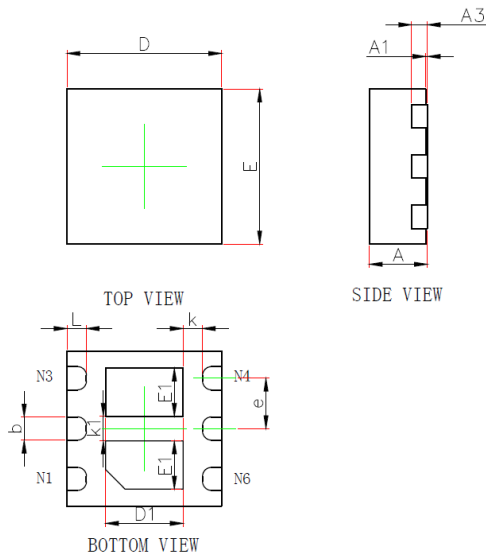
The OVP level then becomes the $V_{zener} + V_{fb}$, and if a 5.6V zener diode is used, then the OVP level is $5.6V + 0.5V = 6.4V$. Such OVP level will have a very good temperature coefficient.

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



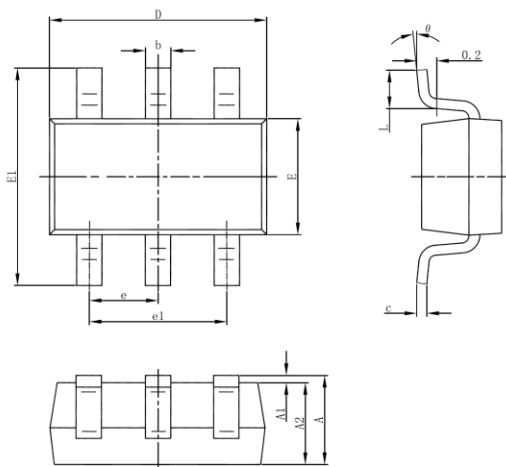
PACKAGE OUTLINE

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

Package: SOT23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°