过电压保护IC

Over Voltage Protection IC

■ FEATURES

・Input Voltage Range: 3V to 36V
・Output Power on Time: 10ms (Typ.)
・OVP Threshold
Fixed 5.85V (Typ.) or Externally adjustable OVP voltage
・60ns Fast Transient response
・RDS(ON) Internal Switches:125mΩ
・Under-Voltage, and Thermal Shutdown Protection
・Packages: Pb-free Packages, SOT23-6

・输入电压范围：3V~36V
・开启延时时间：10ms (Typ.)
・OVP电压：固定5.85V(Typ.)，或外部可调
・60ns快速OVP响应时间
・内置MOS RDS(ON) 125mΩ
・欠压保护和过温关断保护
・SOT23-6封装

■ APPLICATIONS

・GPS ・TWS, Speakers ・Smart Phone
・Digital cameras ・Tablet, MID, PAD
・Peripherals ・Power bank

・GPS ・TWS, 音箱 ・智能手机
・数字摄像机 ・平板，MID, PAD
・外围设备 ・充电宝

■ DESCRIPTION

The HT4066 over-voltage protection device features an ultra-low 125mΩ (TYP) on-resistance high current integrated MOSFET which actively protect low-voltage systems from voltage supply faults up to +36VDC.

The device will switch off internal MOSFET to disconnect VIN to VOUT to protect load when input voltage over the threshold.

When the OVLO input is connected to GND, the HT4066 automatically choose the internal fixed OVLO threshold, preset to be 5.85V typical. The over-voltage protection threshold can be adjusted with an optional external resistor-divider to a voltage between 4V and 10V.

In case the device temperature exceeds the maximum junction temperature, the device switches off.

The HT4066 are available in Green SOT23-6 package, and operate over an ambient temperature range of -40℃ to +85℃.

HT4066是一颗过压保护IC，其内置125mΩ(TYP)大电流MOS，其可对低电压工作的系统进行电压保护，最高+36VDC。
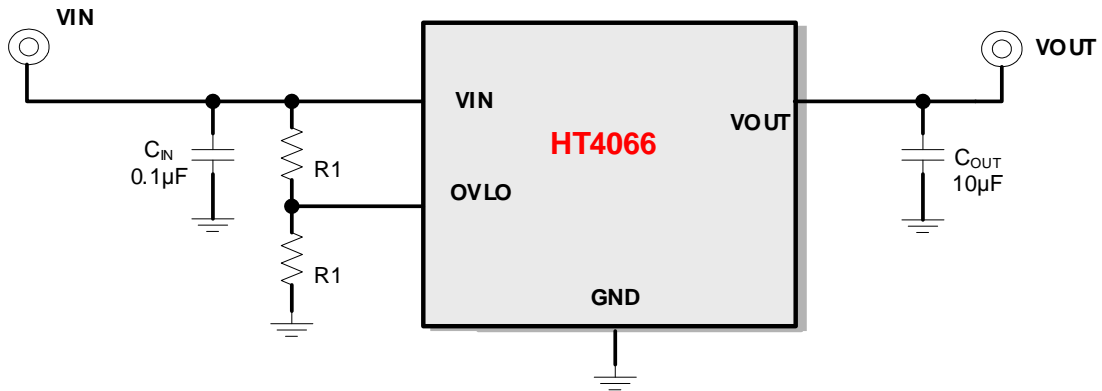
当VIN电压超过OVP值时，HT4066将关闭MOS以关断VIN到VOUT的路径，从而保护负载。

当OVLO接地时，HT4066自动设置为固定的5.85V过压保护值。OVLO外接分压电阻时，可设置4~10V的过压保护值。
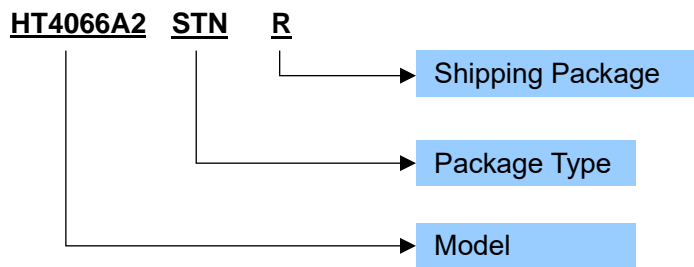
当HT4066超过最大结温时，器件关闭。

该产品提供SOT23-6封装，支持-40℃到+85℃的环境温度。

■ TYPICAL APPLICATION

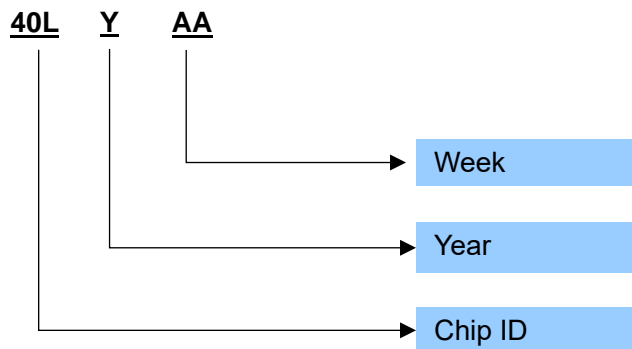## ■ ORDERING INFORMATION

Part Number	Package Type	Marking	Operating Temperature Range	Shipping Package / MOQ
HT4066A2STNR	SOT23-6 (STN)	40LYAA	-40℃～85℃	Tape and Reel (R) / 3000pcs

Part Number

Marking

■ **TERMINAL CONFIGURATION**

OVLO ☐1   6☐ GND

GND ☐2   5☐ GND

VIN ☐3   4☐ VOUT

Top View

■ **TERMINAL FUNCTION**

Terminal No.	Name	Description
1	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.
2, 5, 6	GND	Ground.
3	VIN	Input Voltage. Bypass VIN with 0.1uF capacitor as close as possible to the device.
4	VOUT	Output voltage. Bypass VOUT with 10uF capacitor as close as possible to the device.

■ SPECIFICATIONS[1]

● Absolute Maximum Ratings [2]

PARAMETER	Symbol	MIN	TYP	MAX	UNIT
Input Voltage Range	VIN	-0.3		36	V
Output Voltage Range	VOUT	-0.3		VIN+0.3	V
OVLO pin	OVLO	-0.3		7	V
Continuous Current	I_{IN}			3	A
Moisture Sensitivity Level (MSL)			MSL3		
Ambient Operating Temperature	T_A	-40		85	℃
Junction Temperature	T_J	-40		150	℃
Storage Temperature	T_{STG}	-55		150	℃

● Recommended Operating Conditions

PARAMETER	Symbol	CONDITION	MIN	TYP	MAX	UNIT
Input Voltage Range	VIN		2.7		36	V
Output Capacitance Range	C_{OUT}		10		100	uF
Ambient Operating Temperature	T_a		-40	25	85	℃

● ELECTRICAL CHARACTERISTICS

(VIN = 5V, IIN ≤ 3A, T_A = -40℃ to +85℃, typical values are at TA = +25℃, unless otherwise noted.)

PARAMETER	Symbol	CONDITION	MIN	TYP	MAX	UNIT
Input Operating						
Input Operating Range	VIN		2.5		36	V
Input Supply Current	I_{IN}			70		uA
Under-Voltage Lockout Threshold	V_{IN_UVLO}			1.15		V
Under-Voltage Lockout Hysteresis	V_{UVLO_HYST}			0.02		V
OVP						
Internal Over-Voltage Trip Level	V_{IN_OVLO}	VIN rising		5.85		V
		VIN Falling		5.8		V
OVLO Preset Threshold Range	V_{OVLO_TH}			1.15		V
Adjustable OVLO Threshold Range			4		10	V
External OVLO Select threshold	V_{OVLO_SEL}			0.34		V
Switch On-Resistance	$R_{DS(ON)}$	VIN=5V, I_{IN}=1A, T_A=25℃		125		mΩ
OVLO Input Leakage Current	I_{OVLO}	V_{OVLO} = V_{OVLO_TH}	-100		100	nA
Output power-on time	t_{ON}	VIN=0→5V to output ON		10		ms
OVP recovery time	$T_{ON(OVP)}$	VIN=10→5V to output ON		10		ms
Switch Turn-On Time	t_R	VIN = 5V, RL = 100Ω, C_{LOAD} = 100uF VOUT from 10%, VIN to 90% VIN		0.35		ms
OVP active time	t_{OFF}	VIN>V_{IN_OVLO} to VOUT stop rising		60		ns
OCP						
Over current protection level	I_{OCP}			1.8		A
OTP						
OTP threshold	T_{OTP}			150		℃
OTP hysteresis	T_{OTP_HYS}			20		℃

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[1] Depending on parts and PCB layout, characteristics may be changed.

[2] Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under recommended operating conditions is not implied. Exposure to absolute–maximum–rated conditions for extended periods may affect device reliability.

Figure 1 Timing Diagram

■ APPLICATION INFORMATION

1 USB On-The-Go (OTG) Operation

When used in an OTG application the HT4066 can provide power from OUT to IN. Initially, the OTG voltage applied at OUT will forward-bias the power switch bulk diode and present a voltage drop of approximately 0.7V between OUT and IN. The maximum current in this mode is limited by the thermal performance of the device and at an ambient temperature of +25℃.

I_{MAX} = 1.17W/0.7V = 1.67A

This is purely a transitionary condition as once the voltage at IN exceeds the UVLO voltage of 1.15V and the Output power-on time of 10ms has elapsed, the main power switch will turn fully ON, significantly reducing the voltage drop from OUT to IN.

在 TOG 应用中，HT4066 可通过内部功率管的体二极管，将在 VOUT 处施加的 OTG 电压，传输至 VIN 端，并在 VOUT 和 VIN 之间呈现约 0.7V 的压降。其流过的最大电流主要取决于器件的热表现和环境温度。当环境温度为 25℃ 时，

I_{MAX} = 1.17W/0.7V = 1.67A

这是一种过渡状态，因为一旦 VIN 处的电压超过 1.15V 的 UVLO 电压，并且经过 10ms 的启动时间，主电源开关将完全接通，从而显著降低从 OUT 到 IN 的电压降。

2 OVLO (Over-Voltage Lockout)

The HT4066 has a 1.15V (TYP) over-voltage trip threshold on the OVLO pin. With a resistor-divider on OVLO pin from VIN to GND, the over-voltage protection point of VIN can be adjusted between 4V and 10V. Once the OVLO pin voltage exceeds the OVLO select voltage, V_{OVLO_SELECT} (0.34V TYP), the comparator reads the OVLO pin voltage (a fraction of VIN) set by the external resistor-divider (R1, R2).

R1 = 1MΩ is a good starting value for minimum current consumption. Since V_{IN_OVLO}, V_{OVLO_THRESH}, and R1 are known, R2 can be calculated from the following formula:

V_{IN_OVLO} = V_{OVLO_TH} × (1 + R1/R2) = 1.15V × (1 + R1/R2)

When the OVLO pin is connected to GND, HT4066 provides 5.85V (TYP.) OVLO threshold trip voltage.
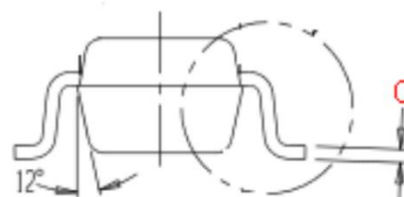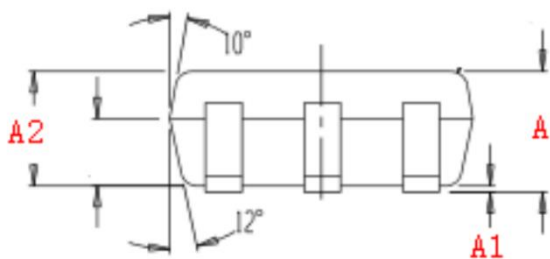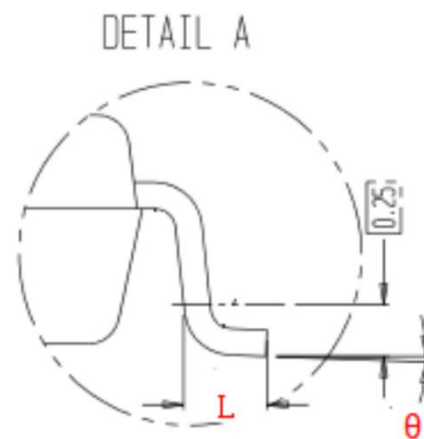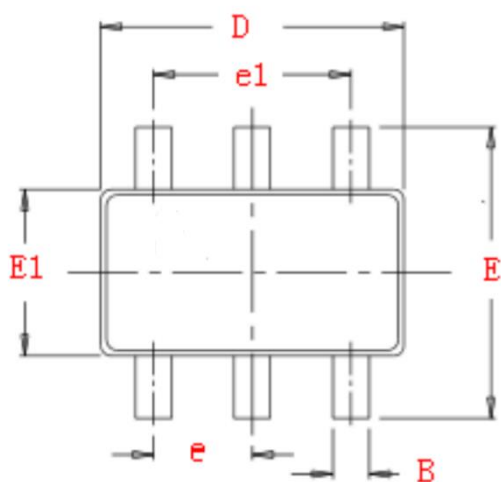
HT4066 在 OVLO pin 上的启动过压保护的阈值为 1.15V (TYP)。在 OVLO 上放置 VIN 到 GND 的分压电阻，过压保护值可设置到 4V~10V 之间。当 OVLO 引脚电压超过 V_{OVLO_SELECT} (0.34V TYP)，OVLO 内部比较器读取 OVLO 的电压。

R1= 1MΩ 是较为合理的取值，以得到较小的电流消耗。当 R1 值确定后，R2 值可通过下面的公式得到：

V_{IN_OVLO} = V_{OVLO_TH} × (1 + R1/R2) = 1.15V × (1 + R1/R2)

另外，当 OVLO 引脚接地，HT4066 的过压保护点则为固定的 5.85V (TYP.)。

3 OCP (Over-Current Protection)

The OCP function ensures that the device will disconnect output from input when current through the switch exceed a preset value (default 1.8A). t_{ON} (TYP. 10ms) after the switch is turned off, the device will attempt to resume to connect output from input. If the current is decreased under 1.8A, the device will resume to connect ouput from input.

OCP 功能确保当通过芯片的电流超过预设值(默认 1.8A)时，芯片将断开输出和输入。芯片断开以后，经过 t_{ON}（TYP. 10ms）时间，尝试恢复导通，一旦电流降低到 1.8A 以下，芯片的输入端和输出端将恢复导通。

■ PACKAGE OUTLINE

ST (SOT23-6)

DETAIL A

Symbol	Dimensions in Millimeters	
	Min.	Max.
A	1.06	1.26
A1	0.00	0.10
A2	1.00	1.20
C	0.13	
D	2.72	3.12
E	2.60	3.00
L	0.40	
B	0.30	0.50
e	0.95	
e1	1.90	
E1	1.40	1.80
θ	0°	10°

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