MSKSEMI 美森科
SEMICONDUCTOR

ESD TVS TSS MOV GDT PLED

MSETA7014S2G

Product specification

产品概述

MSETA7014S2G 是一款集成高边侧功率 MOSFET 的过压保护芯片，具有可调的过压保护（OVP）阈值电压功能。

当检测到输入电压超过过压保护阈值电压时，MSETA7014S2G 关闭高边侧场效应管以保护后极负载。

MSETA7014S2G 最高耐压可达 36V，当 FB 引脚悬空或接到地时，内部默认过电压保护阈值为 6.1V。过电压阈值（OVLO）也可以通过设置外部电阻 R1 和 R2 的比值在 4.0V~15V 之间进行调节。

MSETA7014S2G 同时芯片还具有内部过温保护(OTP)功能，它可以监控芯片温度以保护芯片。

MSETA7014S2G 采用环保无卤的 SOT-23-6 封装。

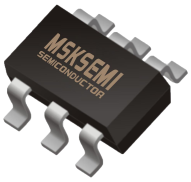
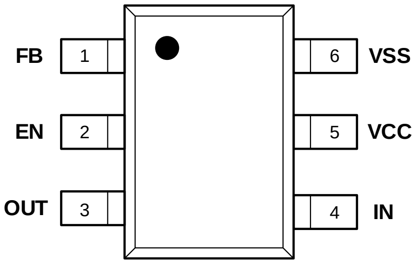
主要特点

- 集成 35mΩ （(典型)@ 5V/1A） N 型场效应管
- 最大持续输出电流 3.0A
- 最大输入电压 36V
- 集成固定 6.1V (±3%) 过压锁定功能 (FB 脚悬空或接地)
- 过压保护阈值电压可调范围：4.0V-15V (±3%)
- (FB 脚外接电阻 R1 和 R2 调节过压保护阈值电压)
- 集成过温保护功能
- 人体模型静电保护：>±2KV（JESD22-A114）
- SOT-23-6L 封装

典型应用

- 便携式电子设备
- 个人多媒体系统
- 移动电话
- 平板电脑
- 电子烟
- 网络摄像机

封装信息

SOT-23-6	引脚排列	管体标记
		 注：****为内部生产代码

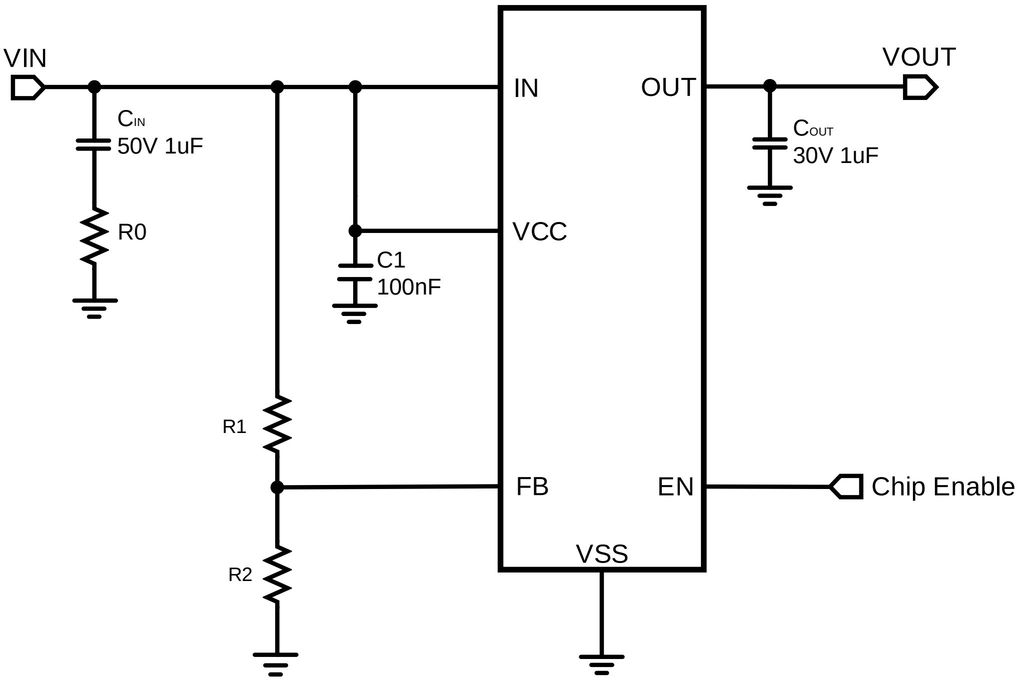
引出端功能

管脚编号	脚位名称	功能
1	FB	与外部分压电阻器连接，设置不同的过压锁定阈值，V_{OVLO}=1.25x(1+R1/R2)，如典型应用图所示。FB 脚接地或悬空时，过压保护阈值电压为内部默认值 6.1V。
2	EN	芯片使能引脚，高电平有效。
3	OUT	输出引脚。
4	IN	芯片功率输入脚。
5	VCC	芯片内部工作电源输入脚
6	VSS	接地

订货信息

型号	封装形式	QTY
MSETA7014S2G	SOT-23-6	3000PCS

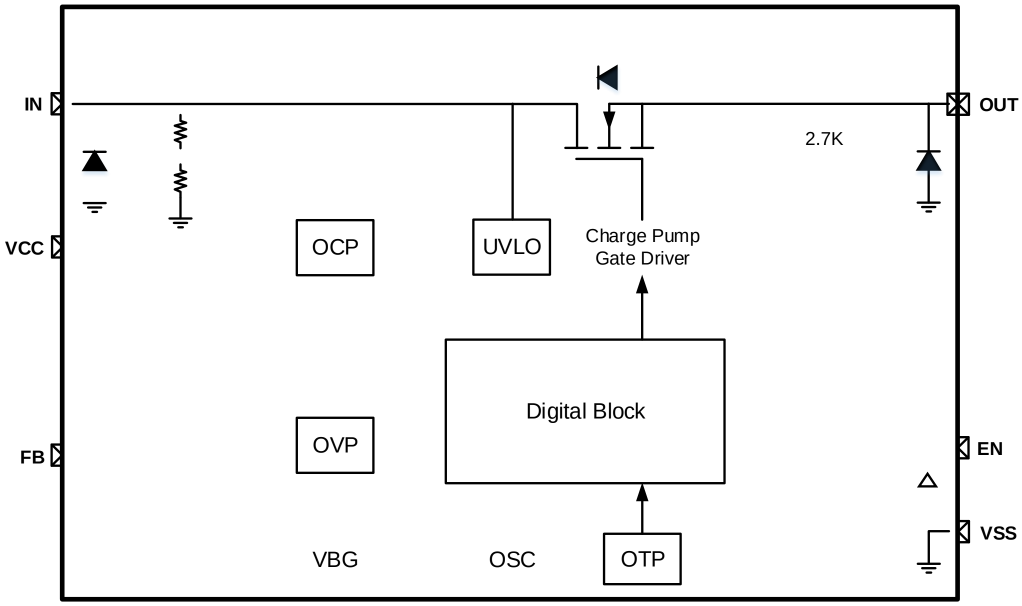
典型应用电路



注:　1、当FB 悬空或接地时，过压保护阈值默认为6.1V；

2、R0 推荐使用2Ω阻值，能够有效提高VIN 端热插拔防浪涌能力！

功能框图



极限参数

(注意：超过这些限制可能会损坏器件。长期暴露在绝对最大额定条件下会影响器件的可靠性。)

参数	符号	最小值	最大值	单位
输入电压 IN	V_{IN}	-0.3	36	V
输入电压 VCC	V_{VCC}	-0.3	36	V
使能控制脚耐压	V_{EN}	-0.3	36	V
输出脚耐压	V_{OUT}	-0.3	36	V
FB 脚耐压	V_{FB}	-0.3	6	V
输入-输出的最大持续电流	I_{SW1}	—	3.0	A
输入-输出的最大峰值电流(10ms)	I_{SW2}	—	6.0	A
功率损耗 (SOT23-6L, T_A = +25℃)	P_D	—	0.45	W
热阻(SOT23-6L)	θ_{JA}	—	250	℃/W
储存温度和结温	T_{stg} , T_J	-65	+150	℃
工作温度	T_A	-40	+85	℃
人体模型静电放电保护	—	2000	—	V

电性能参数

(V_{IN} =V_{CC} =5V 和 T_A =25℃,除非特别说明)

参数	符号	条件	最小值	典型值	最大值	单位
基本参数						
输入电压	V_{IN}		4.0	_	36	V
静态电流	I_Q	V_{EN} =高, 输出悬空	80	150	240	μA
关断电流	I_{SD}	V_{EN} =低, 输出悬空	_	13	25	μA
导通电阻	R_{ON}	V_{IN} =5.0V, I_{OUT} =1A	_	35	_	mΩ
输出放电电阻	$R_{DISCHARGE}$	V_{IN} =5.0V	_	2.7	_	KΩ
高使能阈值电压	V_{EN-H}	V_{EN} 上升	1.0	_	_	V
低使能阈值电压	V_{EN-L}	V_{EN} 下降	_	_	0.4	V
过压锁定阈值	V_{OVLO}	V_{IN} 上升，FB悬空或接地	5.9	6.1	6.3	V
过压锁定迟滞	$V_{OVLO-HYS}$	V_{IN} 下降	_	150	_	mV
欠压锁定阈值	V_{UVLO}	V_{IN} 上升	_	3.25	_	V
欠压锁定迟滞	$V_{UVLO-HYS}$	V_{IN} 下降	_	150	_	mV
OVP FB 阈值电压	V_{FB}		1.2	1.25	1.3	V
上电去抖动延时	t_{DEB}	时间范围从3.35V<V_{IN}< V_{OVLO} 到 V_{OUT} =10% of V_{IN}	-	12	-	ms
开关软启动时间	t_{ON}	R_L =10Ω, C_L =22μF,输出从0.1×V_{IN} 到0.9×V_{IN}	-	120	-	μs
输出上电时间	t_{ON_ALL}	时间范围从3.35V<V_{IN}< V_{OVLO} 到 V_{OUT} =90% of V_{IN}	-	12.12	-	ms

开关关断响应时间	t_{OFF_RES} (1)	V_{IN} ＞ V_{OVLO} 到输出停止上升	_	50	_	ns
过温保护						
热关断	V_{OTP}		_	145	_	℃
热关断迟滞	$V_{OTP-HYS}$		_	40	_	℃

特征曲线

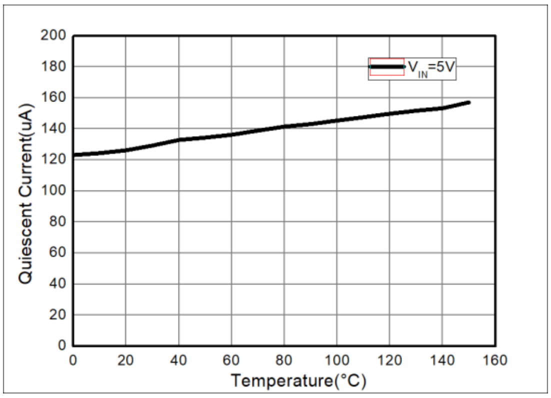


图 1: 静态电流 vs 温度

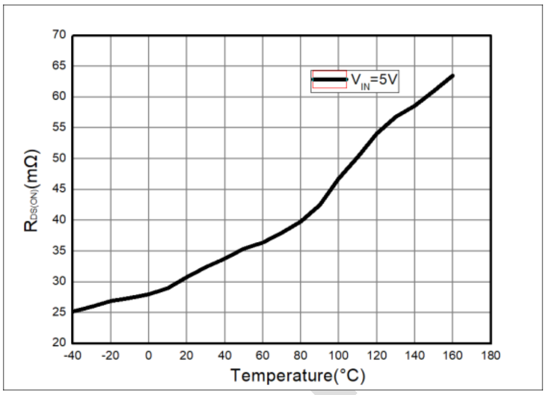


图 2: 输出电阻 vs 温度

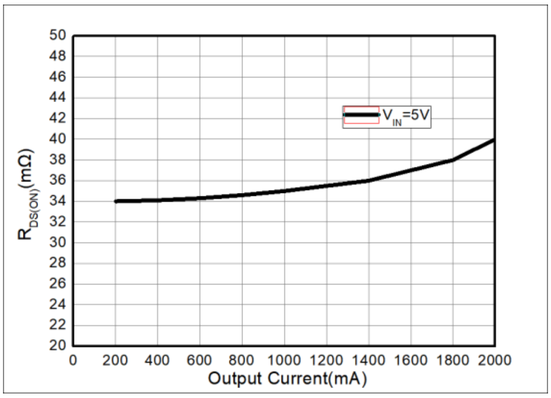


图 3: 导通电阻 vs 输出电流

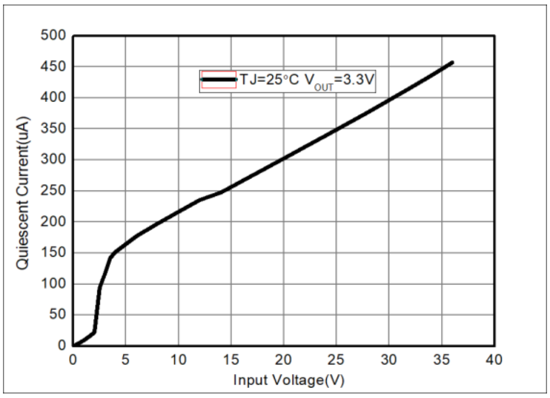


图 4: 静态电流 vs 输入电压

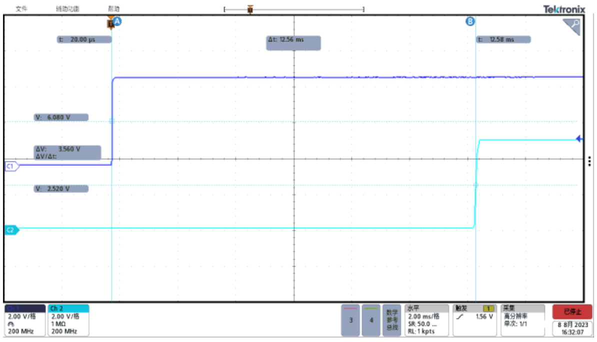


图 5: 上电去抖动延时, T_{DEB}=12.56ms

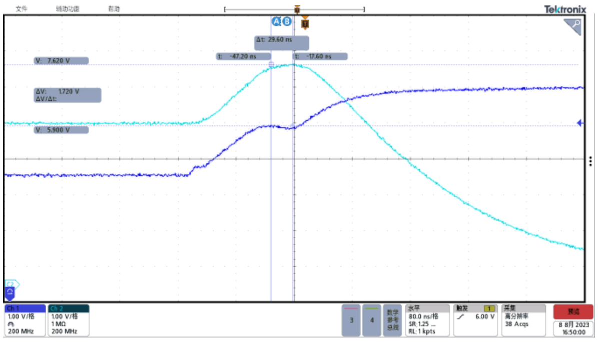


图 6: 过压保护响应时间, T_{OFF_RES}=29.6ns

动态特性

（V_{IN}=5V 和 T_A=25℃，除非特别说明）

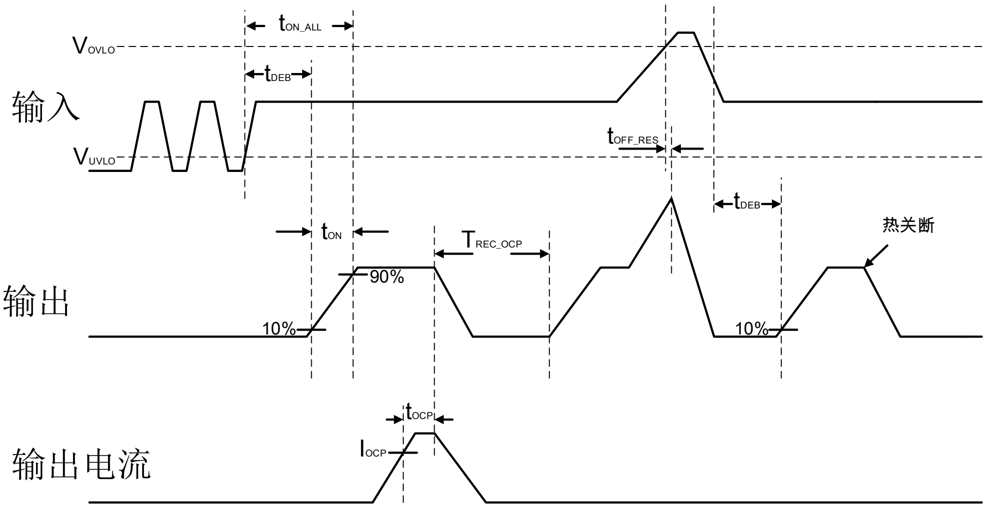


图 7 动态时序图

*注：波形是不按比例

应用描述

MSETA7014S2G是一款过压保护芯片，过压保护阈值点可以通过外部器件来调节。内置35mΩ(典型值)NMOS管，可以保证通过较大的电流而不会发热进入温度保护状态。

上电复位功能

MSETA7014S2G内置阈值电压为3.3V，迟滞150mv 的上电复位电路。输入电压未达到上电复位阈值电压时，MSETA7014S2G关闭。当输入电压超过上电复位阈值电压时，MSETA7014S2G的输出电压将延迟12.12ms 输出，其中去抖动时间为12ms。在软启动过渡期间，MSETA7014S2G缓慢打开内部MOSFET 以减少涌流。

MSETA7014S2G具有过压保护阈值电压可调功能。MSETA7014S2G还具有内部过温保护(OTP)功能，它可以监控芯片温度以保护芯片。

过压保护功能

MSETA7014S2G具有过压保护功能，当FB引脚悬空或者连接到地，过压保护阈值电压使用内部默认值6.1V，一旦输入电压超过6.1V，输出引脚将快速放电到地，典型的关断时间为50ns。客户还可以通过R1（建议R1小于100K）和R2电阻分压器任意定义过压保护触发电压，如下公式所示。

$$V_{OVLO} = \frac{(R1+R2)*1.25}{R2}$$

当我们使用外部R1和R2分压器时，响应时间会比使用内部默认值大得多，典型的响应时间会大于100ns。

过温保护功能

MSETA7014S2G内置过温保护功能以检测其内部温度防止热故障。当温度达到145℃时，芯片关闭功率场效应管，当结温降到105℃时，芯片重新启动。

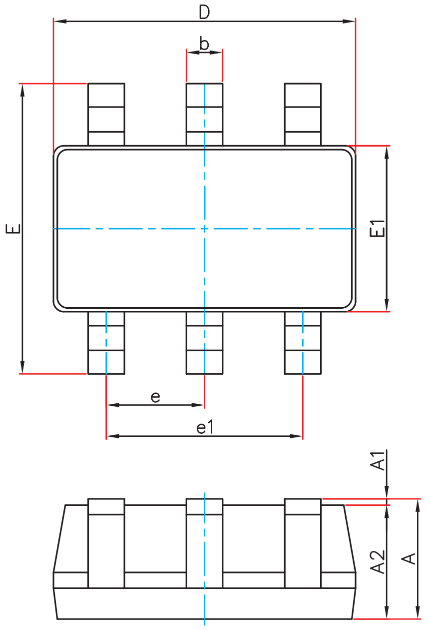
输入电容

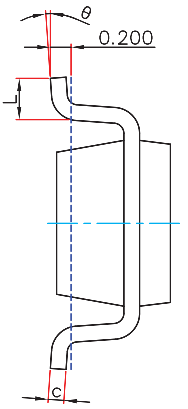
当内部场效应管开通到输出端的负载电容或输出端短路时，为了限制瞬时涌流对输入电源造成的电压降，建议在IN 和VSS 引脚之间放置1μF/50V MLCC 电容或更大电容。

输出电容

在OUT和VSS引脚之间应该放置一个1μF或更大的电容。

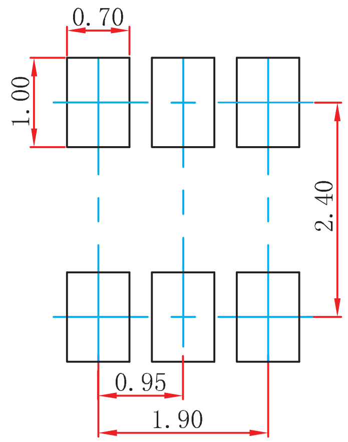
SOT-23-6 Package Outline Dimensions





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
E1	1.500	1.700	0.059	0.067
E	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°

SOT-23-6 Suggested Pad Layout



Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

Attention

- Any and all MSKSEMI Semiconductor products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your MSKSEMI Semiconductor representative nearest you before using any MSKSEMI Semiconductor products described or contained herein in such applications.
- MSKSEMI Semiconductor assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specificationsof any andall MSKSEMI Semiconductor products described orcontained herein.
- Specifications of any and all MSKSEMI Semiconductor products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer’s products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer’sproducts orequipment.
- MSKSEMI Semiconductor. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with someprobability. It is possiblethat these probabilistic failures could give rise to accidents or events that could endanger human lives, that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits anderror prevention circuitsfor safedesign, redundant design, and structural design.
- In the event that any or all MSKSEMI Semiconductor products(including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from theauthorities concerned in accordance with the above law.
- No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of MSKSEMI Semiconductor.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. MSKSEMI Semiconductor believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringementsof intellectual property rights or other rightsof third parties.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. Whendesigning equipment, referto the "Delivery Specification" for the MSKSEMI Semiconductor productthat you intend to use.