■ 概述

HM53XX系列是专为功耗敏感应用研发设计的一款高输入电压、超低功耗的低压差线性稳压器。

最大允许的输入电压可达35V，且输出100mA电流时输入输出电压差仅300mV。典型情况下，静态电流1.6μA，具有几个固定的输出电压1.8V，2.5V，3.0V，3.3V，3.6V，4.0V，4.2V，5.0V。

IC内部集成了短路保护和热关断功能。

尽管主要为固定电压调节器而设计，但这些IC 可与外部元件结合来获得可变的电压和电流。

■ 应用

- 电池供电设备
- 烟雾传感器
- 微控制器
- 家用电器与仪器

■ 特点

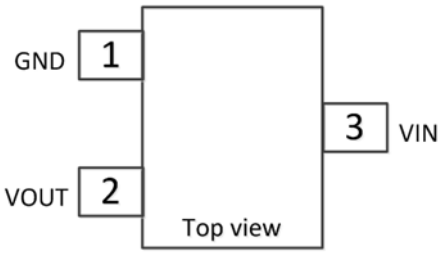
- 超低静态电流 1.6uA
- 宽输入电压范围 V_{OUT}+1V 至 35V
- 大输出电流 ≥200mA
- 系统启动无过冲
- 短路保护释放无过冲
- 低压降
  30mV@10mA
  300mV@100mA
  600mV@200mA
- 多种固定输出电压 :1.8V, 2.5V, 3.0V, 3.3V, 3.6V，4.0V，4.2V, 5.0V
- 输出电压精度:
  HM53XXA ±1%
  HM53XXB ±2%
- 较好的电源/负载瞬态响应
- 低温度漂移 ±100ppm/℃
- 短路保护功能
- 过热保护功能
- 多种封装类型，适合不同应用需要

HM53XXA/BVR/MR	SOT23/SOT23-3
HM53XXA/BM5	SOT23-5
HM53XXA/BPR	SOT89-3
HM53XXA/BTB	TO92

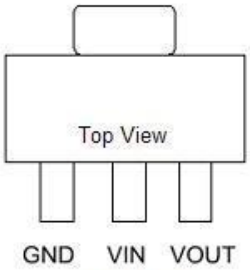
■ 引脚定义

引脚排布		符号	描述
SOT23	SOT23-5/SOT89-3/TO92		
1	1	GND	系统地电位，接输入电源的负端，用电设备供电的负端，以及输入电容和输出电容的负极
2	3	VOUT	线性稳压器的输出，接输出电容正极以及用电设备供电的正端
3	2	VIN	线性稳压稳压器的输入正端，接输入电源的正端，以及输入电容的正极

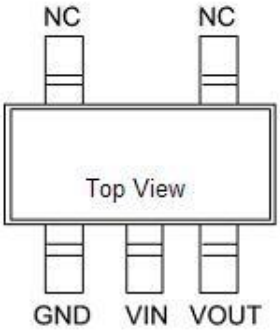
■ 封装形式及引脚分布



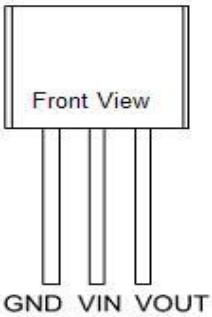
SOT23/SOT23-3



SOT89-3

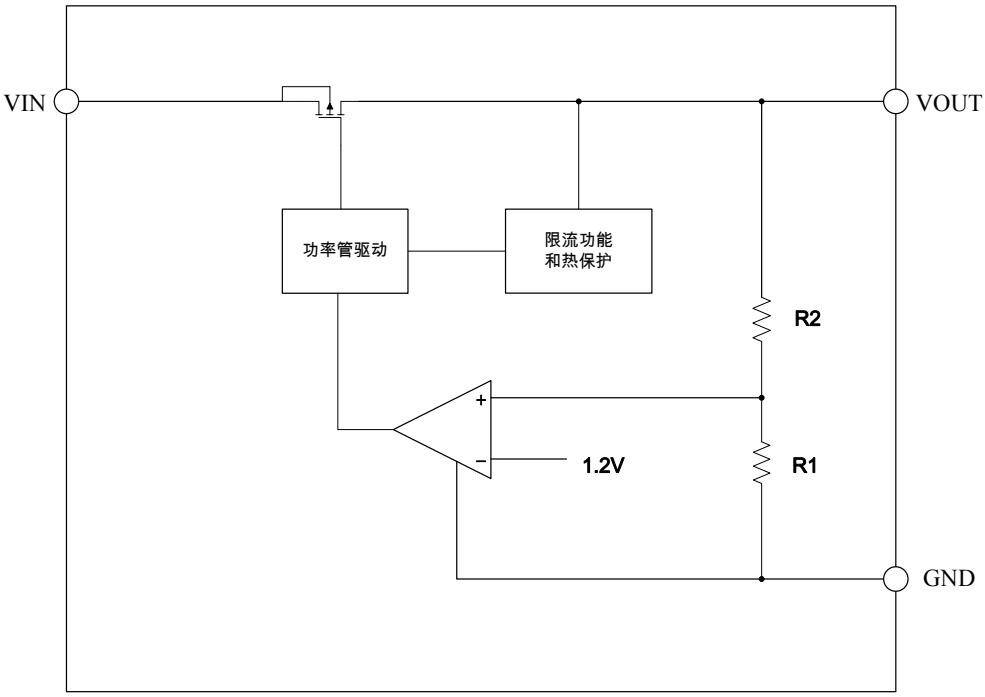


SOT23-5



TO92

■ 方框图



■ 绝对最大额定参数

项目	内容	最小值	最大值	单位
电压	VIN脚对GND脚的耐压	-0.3	40	V
	VOUT脚对GND脚的耐压	-0.3	6	V
	VOUT脚对VIN脚的耐压	-35	0.3	V
电流	峰值电流	内部限流		
温度	工作环境温度	-40	85	℃
	存储温度	-40	150	℃
	最大结温	-	150	℃
封装热阻	SOT23	350		℃/W
	SOT23-5	260		℃/W
	SOT89-3	165		℃/W
	TO92	180		℃/W
封装最大允许功耗	SOT23	350		mW
	SOT23-5	480		mW
	SOT89-3	750		mW
	TO92	690		mW

注：超过额定参数所规定的范围将对芯片造成损害，无法预料芯片在额定参数范围外的工作状态，而且若长时间工作在额定参数范围外，可能影响芯片的可靠性。

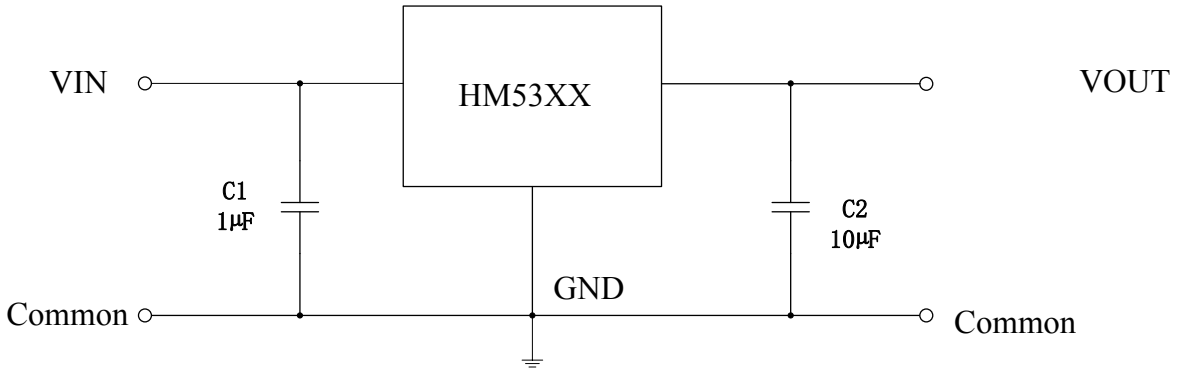
■ 电气参数（除特殊说明外，以下参数均在 TA=25°C，C_{IN}=1uF，V_{IN}=V_{OUTNOM}+1V，C_{OUT}=10μF 条件下测试）

符号	参数	测试条件	最小值	典型值	最大值	单位
V_{IN}	输入电压		3		35	V
I_{GND}	静态电流	无负载		1.6	2.0	μA
$V_{OUT(HM53XXA)}$	输出电压	I_{OUT}=10mA	-1%		1%	V_{OUT}
$V_{OUT(HM53XXB)}$			-2%		2%	V_{OUT}
I_{OUT}	输出电流		200	250	—	mA
V_{DROP}	Dropout电压*1 (HM5350)	I_{OUT}=10mA ΔV_{OUT}= - V_{OUTNOM}*2%	—	30	50	mV
		I_{OUT}=100mA ΔV_{OUT}= - V_{OUTNOM}*2%	—	300	400	mV
		I_{OUT}=200mA ΔV_{OUT}= - V_{OUTNOM}*2%	—	600	750	mV
	Dropout电压 (HM5333)	I_{OUT}=10mA ΔV_{OUT}= - V_{OUTNOM}*2%	—	30	50	mV
		I_{OUT}=100mA ΔV_{OUT}= - V_{OUTNOM}*2%	—	300	400	mV
		I_{OUT}=200mA ΔV_{OUT}= - V_{OUTNOM}*2%	—	600	750	mV
ΔV_{OUT}	负载调整率	1mA≤I_{OUT}≤100mA	—	20	50	mV
ΔV_{OUT} x100/ ΔV_{IN} x V_{OUT}	输入电压调整率	I_{OUT}=1mA, V_{IN}=(V_{OUTNOM}+1V) to 30V	—	—	0.2	%/V
I_{LIMIT}	限流保护	V_{IN}=(V_{OUTNOM}+1V) to 30V R_{LOAD}=V_{OUTNOM}/1A		450		mA
T_{SHDN}	过热保护			125		℃
TC_{VOUT}	温度系数	I_{OUT}=10mA -40℃≤TAMB≤100℃		±100		ppm/℃

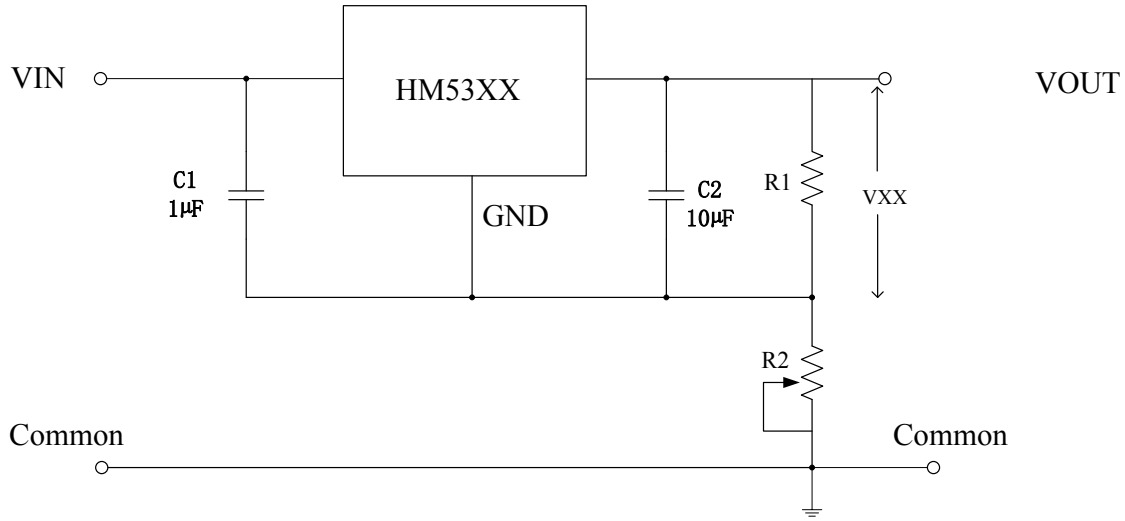
注：*1 Dropout 电压定义为输出电压较其标称值下降 2%时对应的输入输出电压差。

■ 应用电路

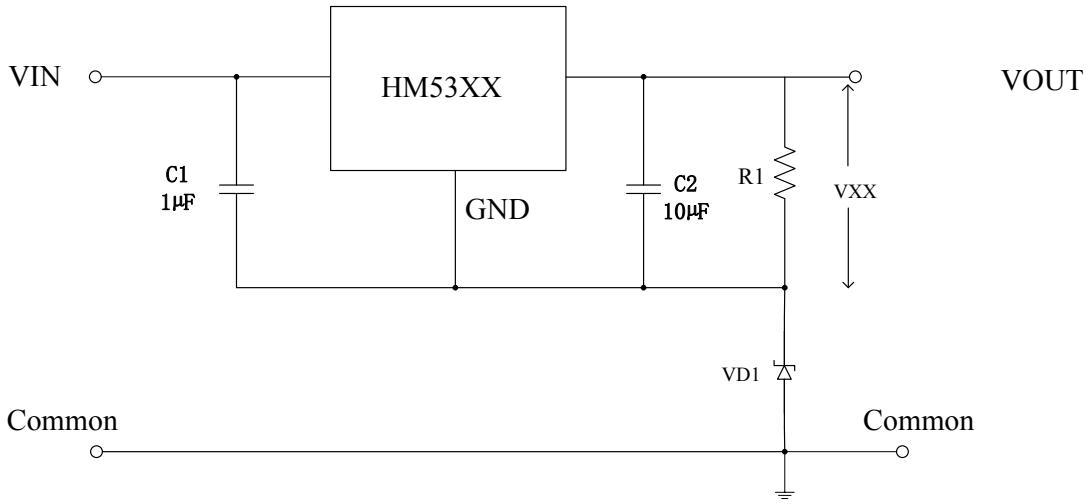
➢ 典型应用电路



➢ 用于增加输出电压的电路 1



➢ 用于增加输出电压的电路 2



■ 应用说明

➢ 功耗计算

内置功率管的功耗 P_D（MOSFET）=(V_{IN}-V_{OUT})*I_{OUT}

芯片整体功耗 P_D(TOTAL)=PD(MOSFET)+V_{IN}*I_{GND}

静态电流 I_{GND} 为 1.6uA，V_{IN}*I_{GND} 功耗可忽略不计，因此最坏情况的功耗为：

$$P_D(max)=[V_{IN}(max)-V_{OUT}(min)]*I_{OUT}$$

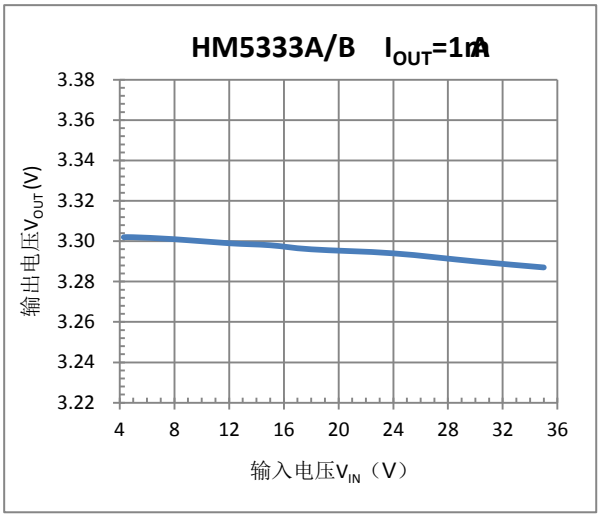
➢ 结温

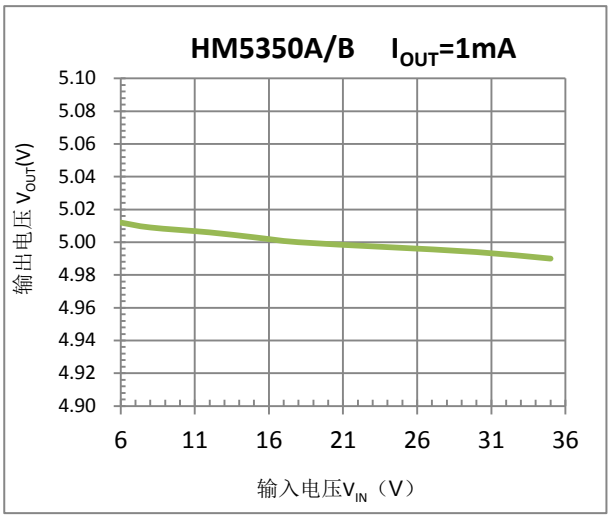
$T_J=P_D(max)*\theta_{JA}+T_A$

式中θ_{JA}表示封装热阻，T_A表示环境温度。

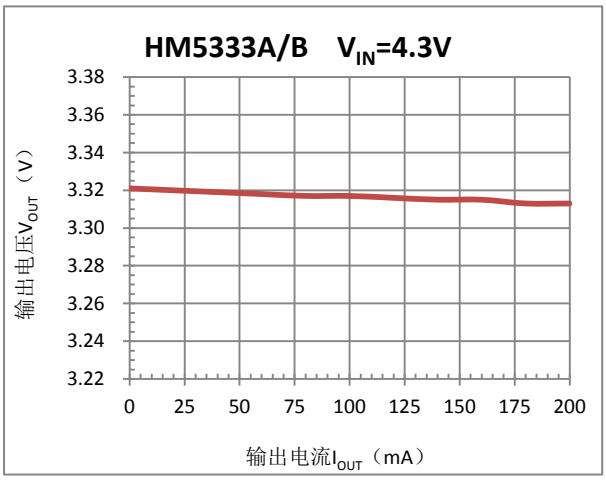
■ 典型性能特点

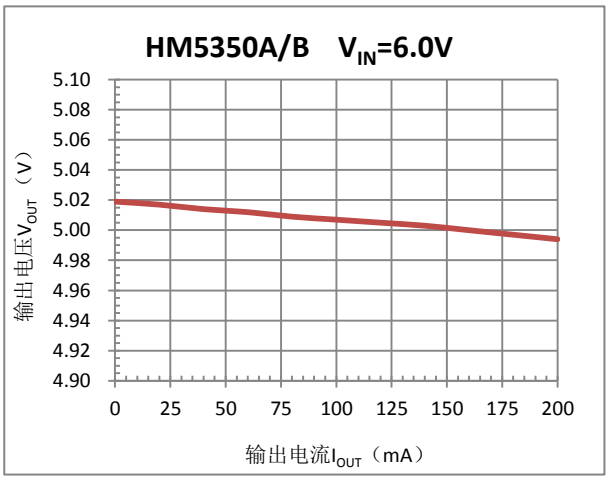
输出电压随输入电压的变化



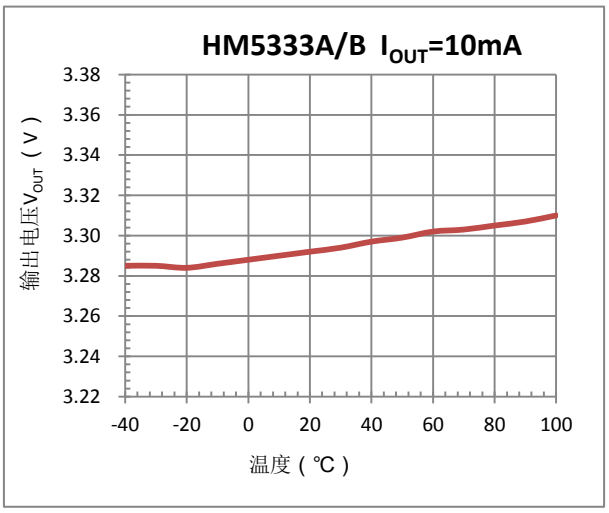


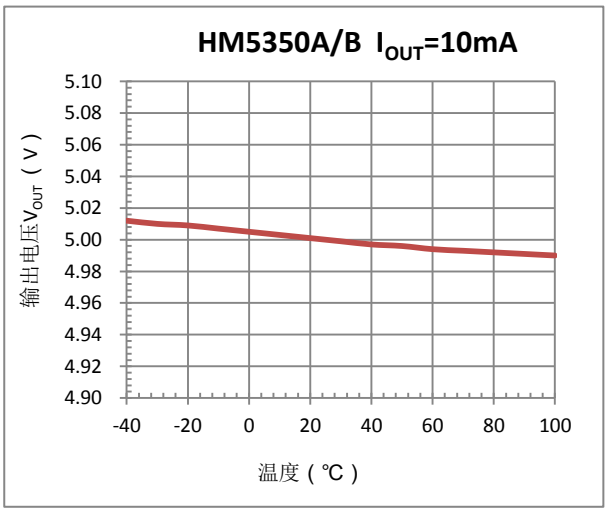
输出电压随输出电流的变化



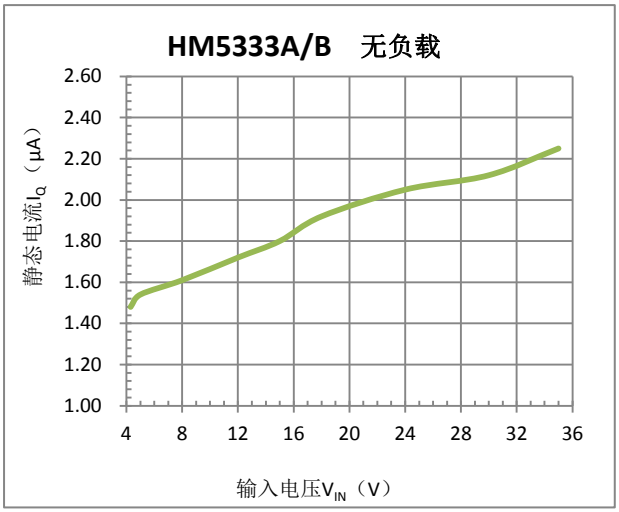


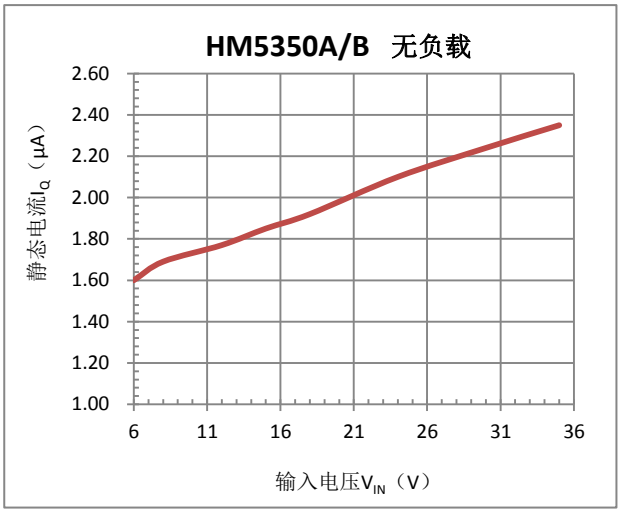
输出电压随温度的变化



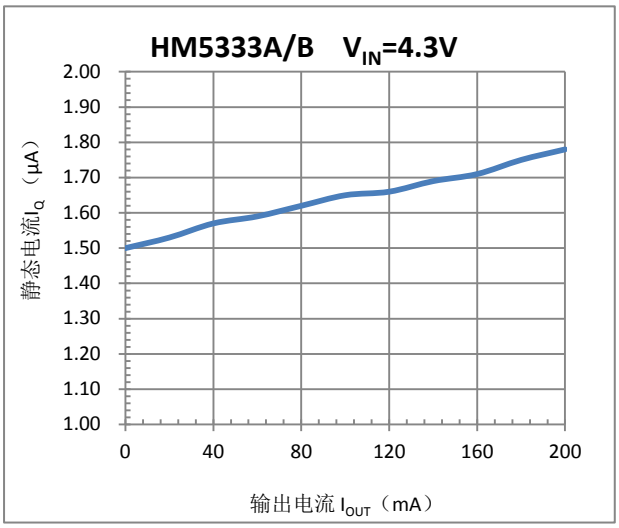


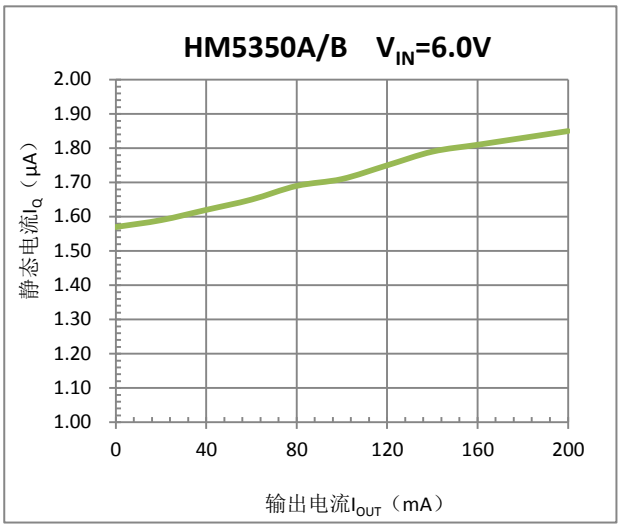
静态电流随输入电压的变化



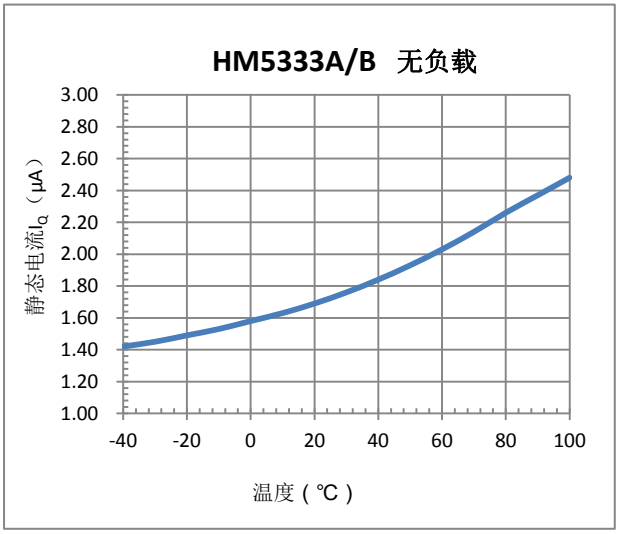


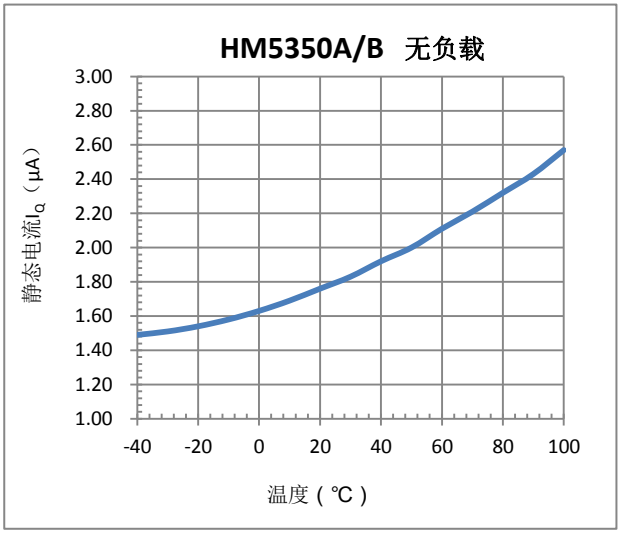
静态电流随输出电流的变化





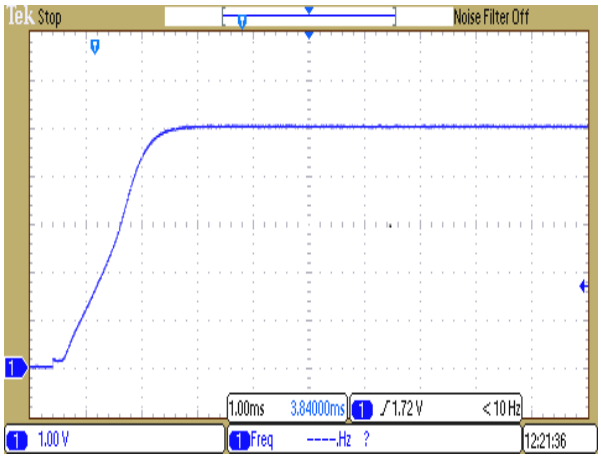
静态电流对温度的变化



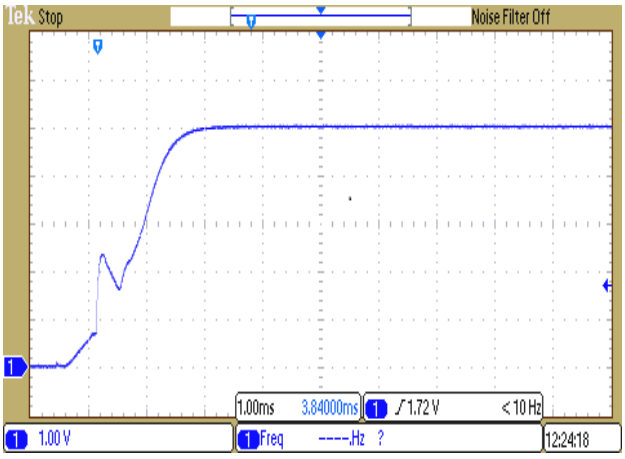


系统空载和带载启动

无负载启动 C_{OUT}=10uF

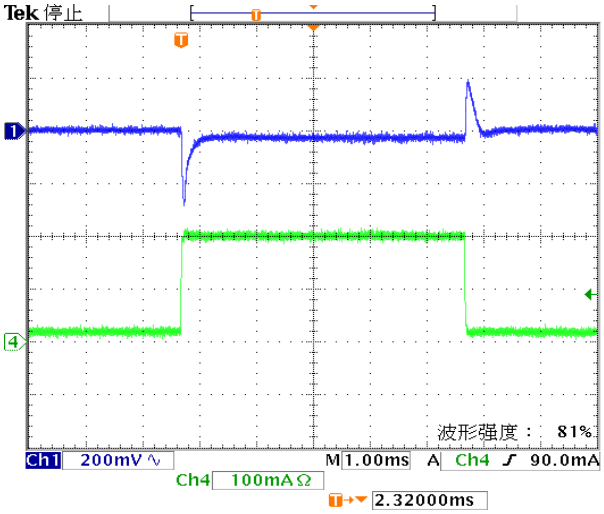


带载30mA启动 C_{OUT}=10uF



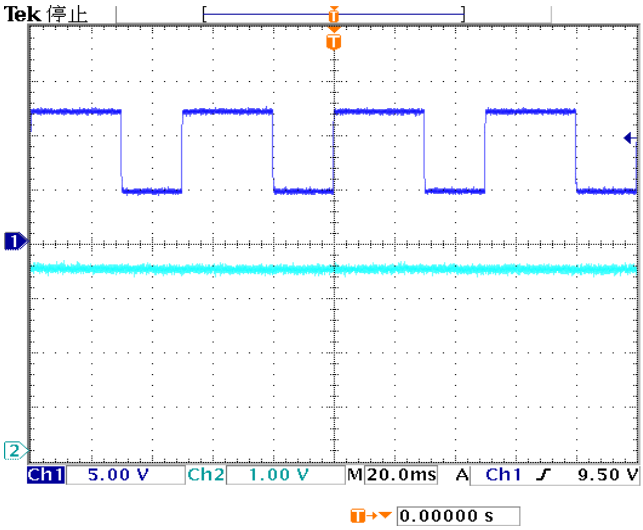
负载跳变的瞬态响应

V_{IN}=12.0V, C_{OUT}=10uF, I_{OUT}=10mA to 200mA



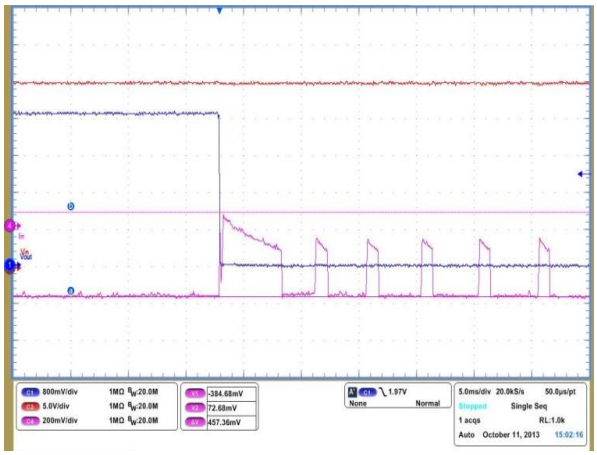
电源跳变的瞬态响应

V_{IN}=5.0V to 12.0V, C_{OUT}=10uF, I_{OUT}=1mA

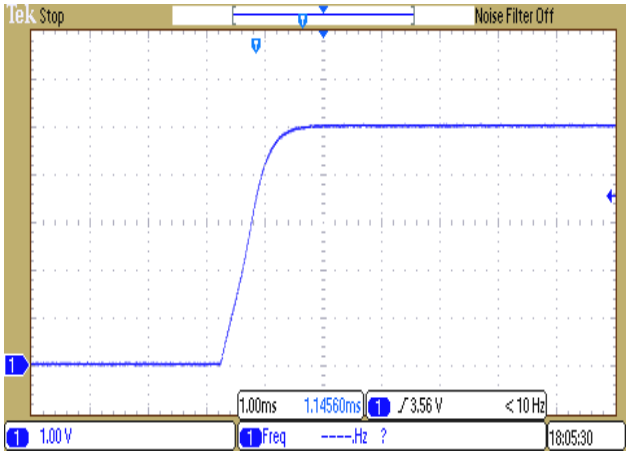


短路保护与释放

V_{IN}=25V，发生短路保护



V_{IN}=25V，短路保护释放

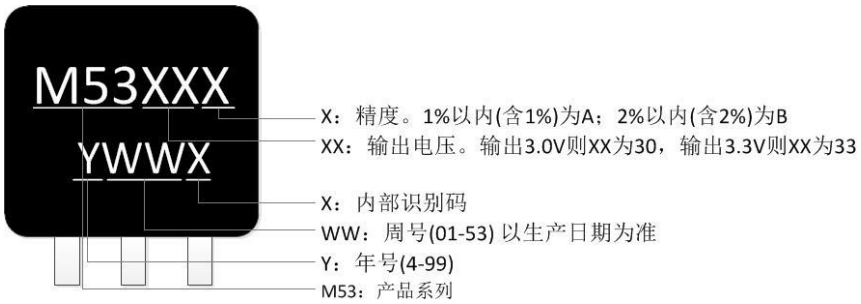


■ 产品选型

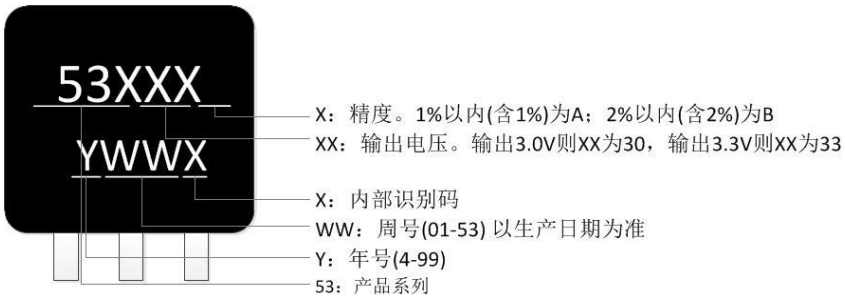
产品型号 (XX: 封装形式代码)	最高输入电压(V)	输出电压 (V)	精度	包装方式及最小订货数量			
				SOT23/SOT23-3 代码:VR/MR	SOT23-5 代码:M5	SOT89 代码:PR	TO92 代码:TB
HM5318AXX	35V	1.8	1%	3K/卷盘	3K/卷盘	1K/卷盘	100/袋 1K/盒
HM5318BXX	35V	1.8	2%				
HM5325AXX	35V	2.5	1%				
HM5325BXX	35V	2.5	2%				
HM5330AXX	35V	3.0	1%				
HM5330BXX	35V	3.0	2%				
HM5333AXX	35V	3.3	1%				
HM5333BXX	35V	3.3	2%				
HM5336AXX	35V	3.6	1%				
HM5336BXX	35V	3.6	2%				
HM5340AXX	35V	4.0	1%				
HM5340BXX	35V	4.0	2%				
HM5342AXX	35V	4.2	1%				
HM5342BXX	35V	4.2	2%				
HM5350AXX	35V	5.0	1%				
HM5350BXX	35V	5.0	2%				

■ 打标信息

SOT89-3/TO92 打标

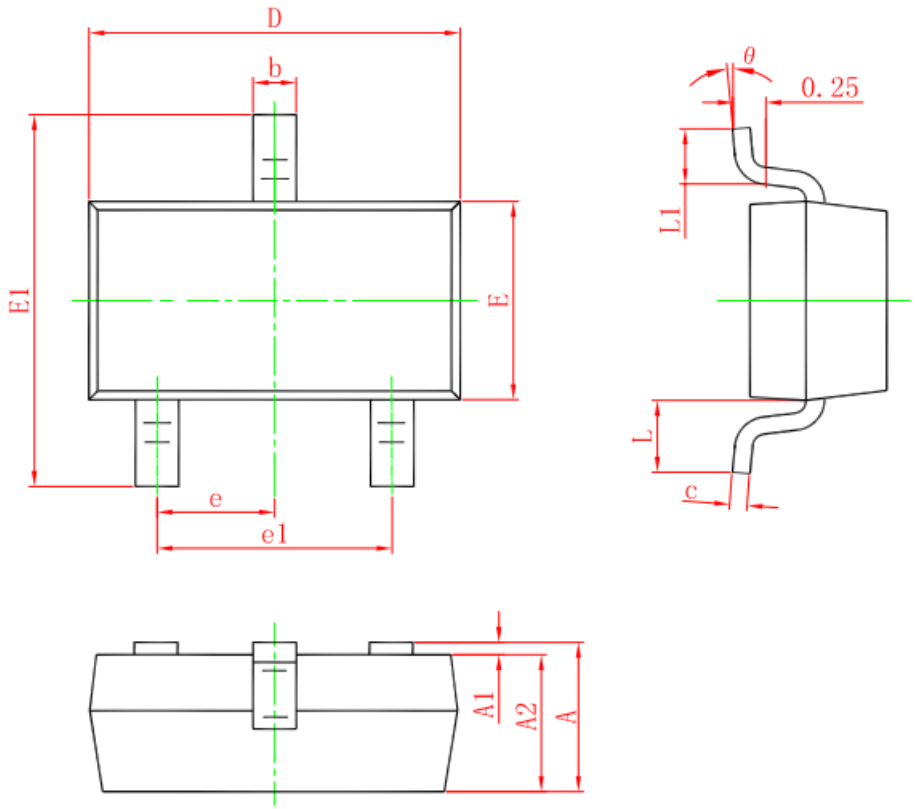


SOT23/SOT23-5 打标



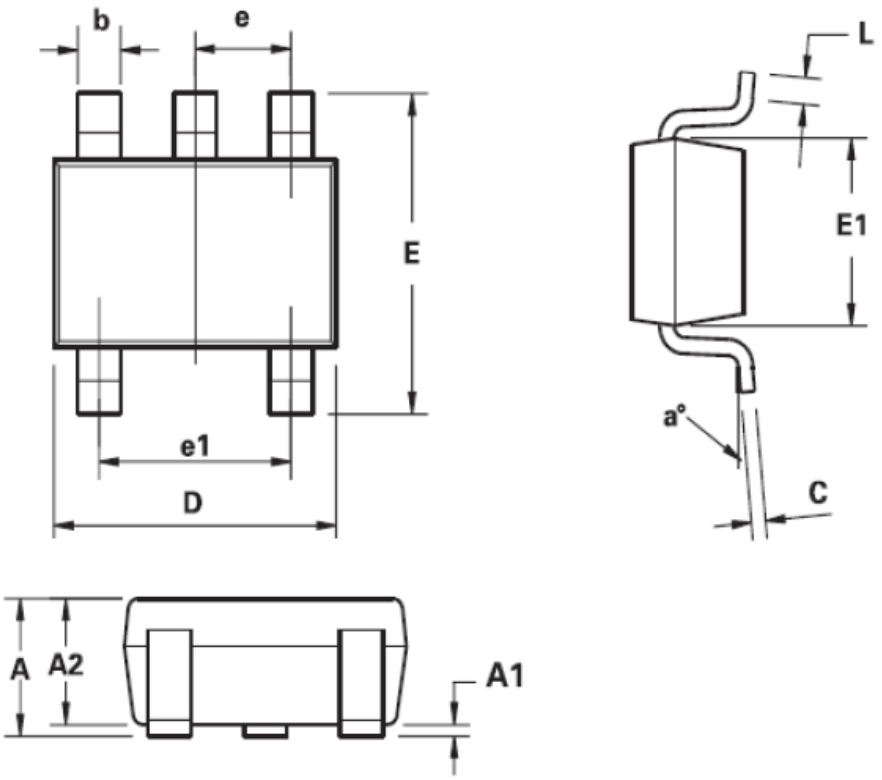
■ 封装信息

3-Pin SOT23 Package



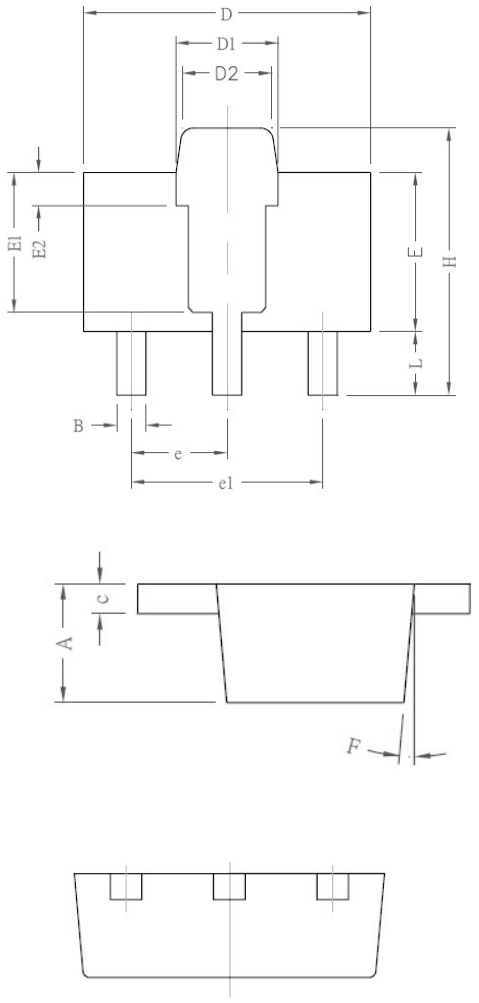
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.550 REF.		0.022 REF.	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°

5-Pin SOT23-5



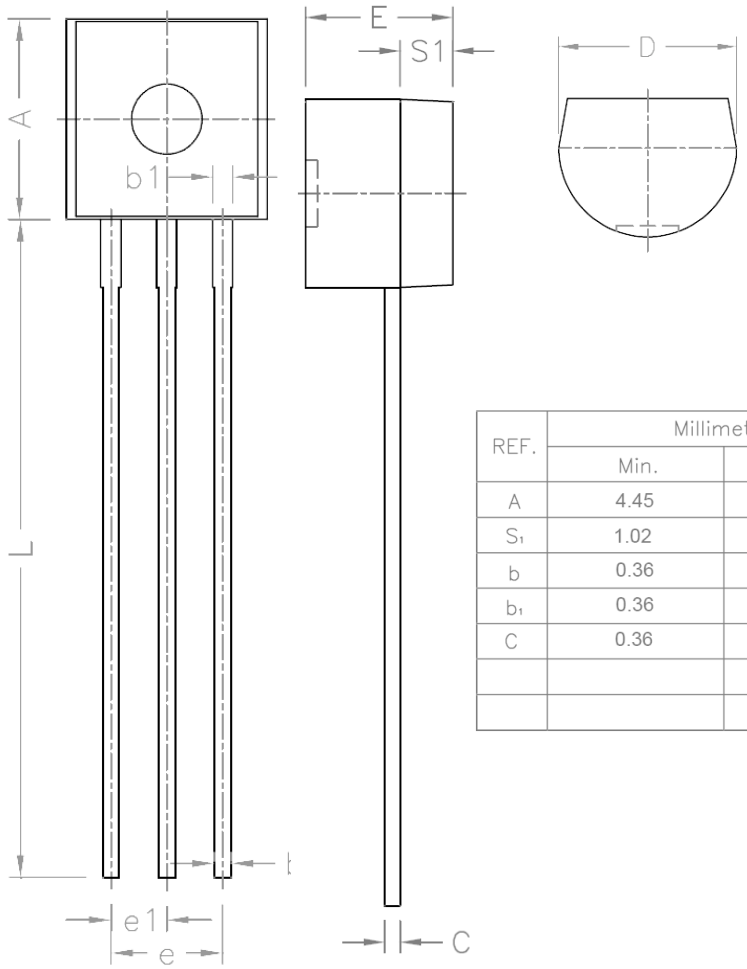
DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.90	1.45	0.0354	0.0570
A1	0.00	0.15	0.00	0.0059
A2	0.90	1.30	0.0354	0.0511
b	0.20	0.50	0.0078	0.0196
C	0.09	0.26	0.0035	0.0102
D	2.70	3.10	0.1062	0.1220
E	2.20	3.20	0.0866	0.1181
E1	1.30	1.80	0.0511	0.0708
e	0.95 REF		0.0374 REF	
e1	1.90 REF		0.0748 REF	
L	0.10	0.60	0.0039	0.0236
a°	0°	30°	0°	30°

3-Pin SOT89-3 Package



REF.	DIMENSIONS Millimeters	
	Min.	Max.
A	1.40	1.60
B	0.40	0.52
c	0.35	0.41
D	4.40	4.60
D1	1.50	1.70
D2	1.30	1.50
E	2.40	2.60
E1	2.20 REF.	
E2	0.52 REF.	
e	1.50 REF.	
e1	3.00 REF.	
F	5° TYP.	
H	4.05	4.25
L	0.89	1.20

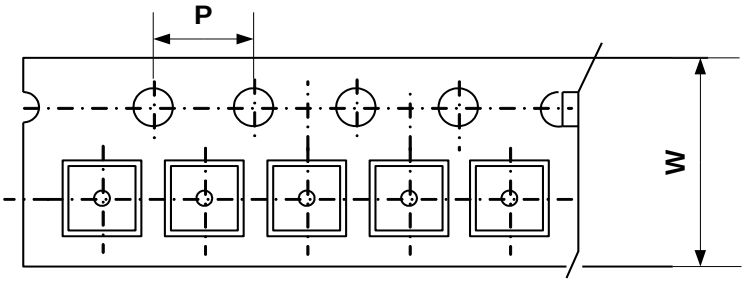
3-Pin TO92 Package

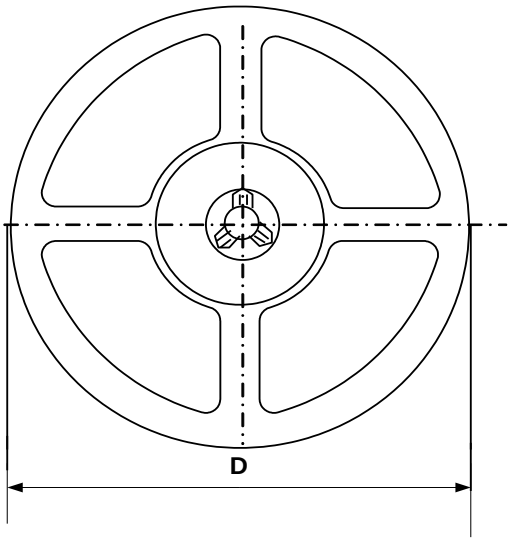


DIMENSIONS

REF.	Millimeter		REF.	Millimeter	
	Min.	Max.		Min.	Max.
A	4.45	4.7	D	4.44	4.7
S_1	1.02	—	E	3.30	3.81
b	0.36	0.51	L	12.70	—
b_1	0.36	0.76	e1	1.15	1.39
C	0.36	0.51	e	2.42	2.66

■ 卷盘编带规格





封装形式	载带宽度 W(mm)	间距 P(mm)	卷盘直径 D(mm)	最小包装数(pcs)
SOT23 SOT23-5	8.0±0.1 mm	4.0±0.1 mm	180±1 mm	3000pcs
SOT89-3	12.0±0.1 mm	4.0±0.1 mm	180±1 mm	1000pcs
TO92-3	/	/	/	1,000pcs/袋 10,000pcs/盒