

# MSKSEMI 美森科

SEMICONDUCTOR



ESD



TVS



TSS



MOV



GDT



PLED

## TLV757P

产品手册

## 概述

TLV757P 系列是一组低压差(LDO) 转换器, 具有 1.2V 至 6V 宽电压输入范围、低压差、低功耗和小型化封装的等特性。TLV757P 低至 2 $\mu$ A 低静态电流特性, 特别适合用于电池供电、长时间待机系统设备应用, 能帮助降低系统设备的待机功耗, 有效延长待机时间和电池使用寿命。TLV757P 有带 EN 使能引脚的版本可选, 将 EN 脚拉低可进入关断模式, 此关断模式下静态电流可降至仅 10nA (典型值)。

TLV757P 系列支持输出电容采用陶瓷电容器, 在 1.2V 至 6V 的宽输入电压范围内和整个输出负载电流 0mA- 600mA 范围内稳定工作。

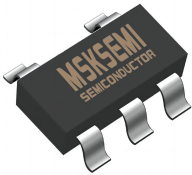
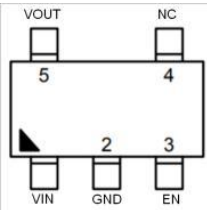
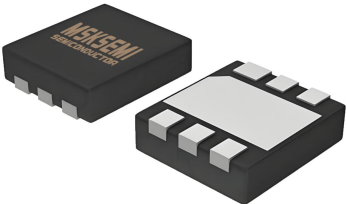
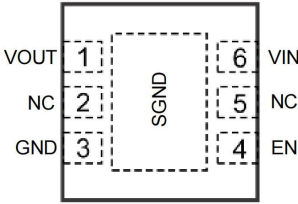
## 产品特点

- 2 $\mu$ A 静态电流 (无负载)
- $\pm 2\%$  输出电压精度
- 600mA 输出电流能力
- 10nA 关断电流(可选版本)
- 宽范围输入电压: 1.2V 至 6V
- 低压差: 0.32V ( $V_o=3.3V/I_o=600mA$  条件下)
- 支持固定输出电压: 1.0V, 1.2V, 1.5V, 1.8V, 2.5V, 2.8V, 3.0V, 3.3V
- 支持陶瓷电容或者钽电容
- 限流保护
- 过温保护
- 提供 SOT-23-5 和 DFN2x2- 6L 封装









## 产品用途

- 手持式、电池供电设备
- 低功耗微处理器
- 笔记本电脑、掌上型电脑和 PDA
- 无线通讯设备
- 音频/视频设备
- 车载导航系统

## 封装脚位信息

SOT-23-5	封装脚位图
	
DFN2x2-6L	封装脚位图
	

**管体标记**

型号	封装	输出电压	管体标记
TLV75710PDBVR-MS	SOT-23-5	1.0V	
TLV75712PDBVR-MS	SOT-23-5	1.2V	
TLV75715PDBVR-MS	SOT-23-5	1.5V	
TLV75718PDBVR-MS	SOT-23-5	1.8V	
TLV75725PDBVR-MS	SOT-23-5	2.5V	
TLV75728PDBVR-MS	SOT-23-5	2.8V	
TLV75730PDBVR-MS	SOT-23-5	3.0V	
TLV75733PDBVR-MS	SOT-23-5	3.3V	

型号	封装	输出电压	管体标记
TLV75710PDRVR-MS	DFN2x2-6L	1.0V	
TLV75712PDRVR-MS	DFN2x2-6L	1.2V	
TLV75715PDRVR-MS	DFN2x2-6L	1.5V	
TLV75718PDRVR-MS	DFN2x2-6L	1.8V	
TLV75725PDRVR-MS	DFN2x2-6L	2.5V	
TLV75728PDRVR-MS	DFN2x2-6L	2.8V	
TLV75730PDRVR-MS	DFN2x2-6L	3.0V	
TLV75733PDRVR-MS	DFN2x2-6L	3.3V	

**引脚功能描述**

脚位号		名称	功能描述
SOT-23-5	DFN2x2		
2	3	GND	接地
5	1	VOUT	电源输出端口
1	6	VIN	电源输入端口
3	4	EN	使能控制
4	2,5	NC	浮空脚
	Exposed Pad	SGND	散热焊盘, 浮空或连接到地

**订单信息**

型号	封装	最小包装
TLV757xxPDBVR-MS	SOT-23-5	3000
TLV757xxPDRVR-MS	DFN2x2-6L	3000

**典型应用电路**

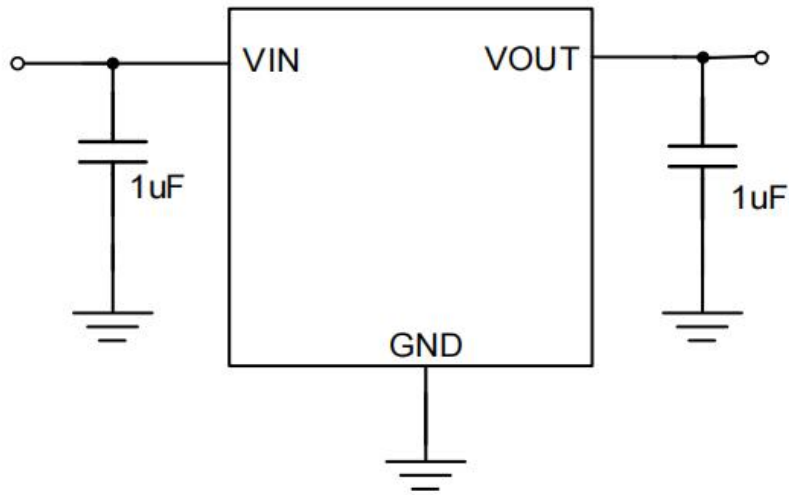


图 1: 固定输出应用电路

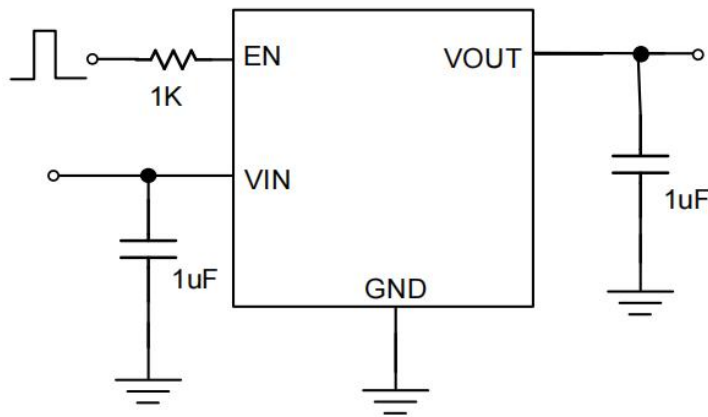


图 2: 带使能脚的固定输出应用电路

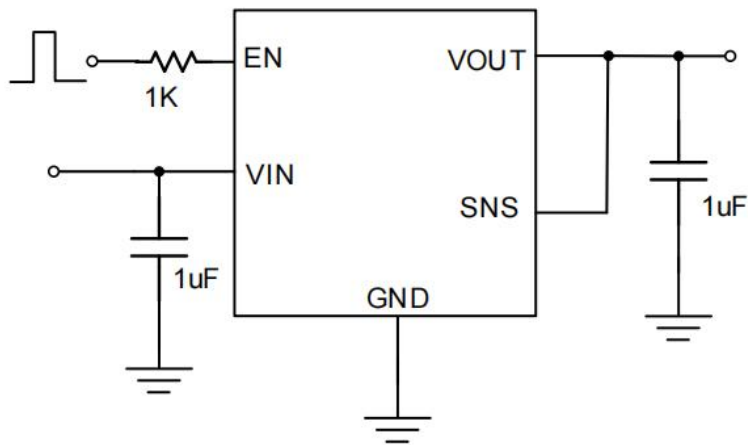


图 3: 固定输出带使能功能和输出电压检测功能之应用电路

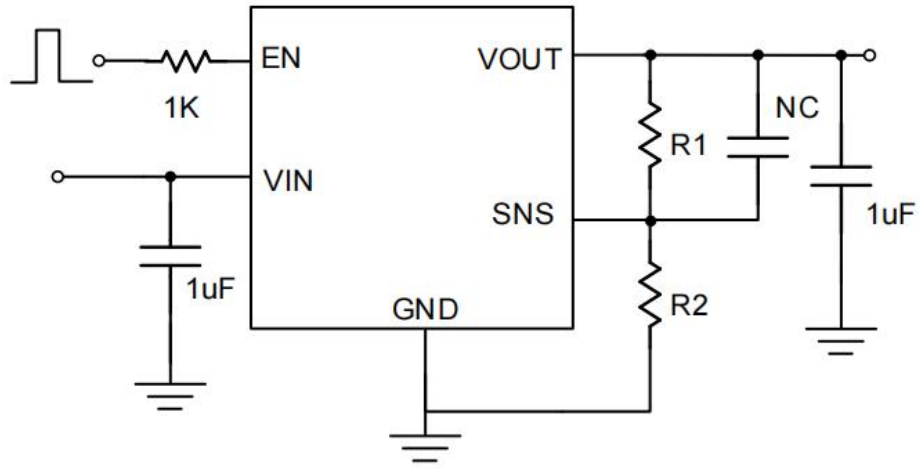
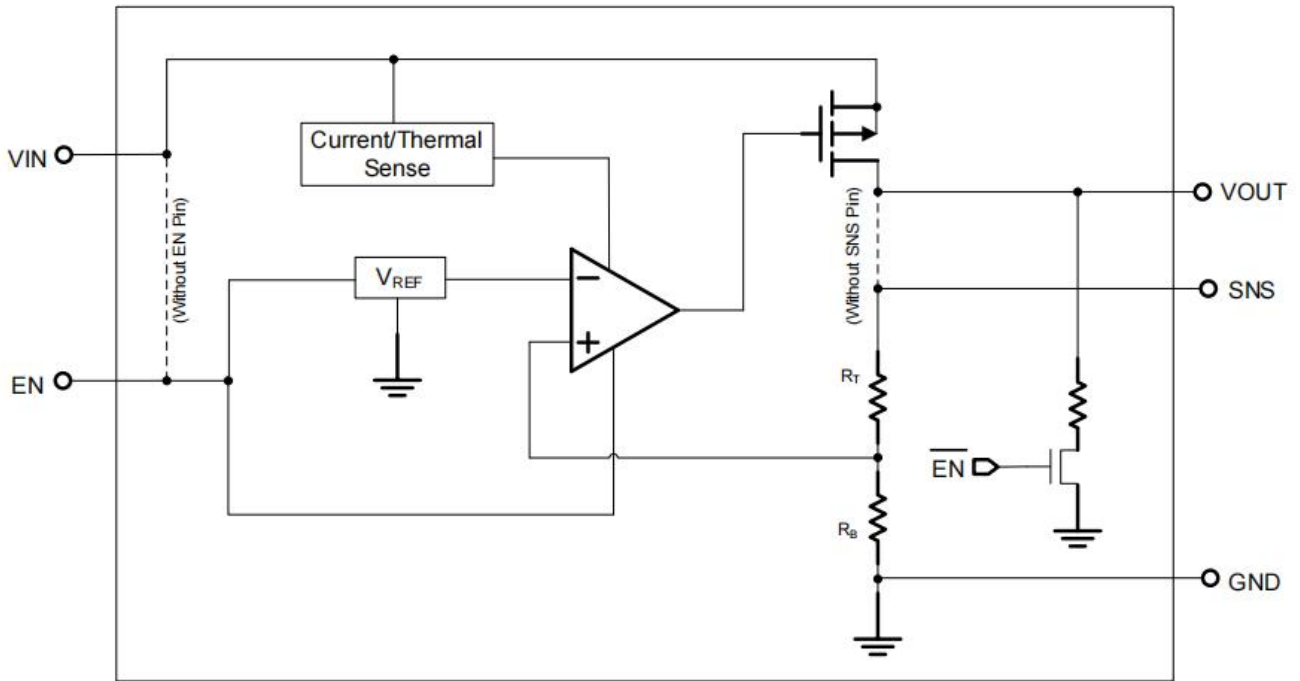


图 4: 带使能脚和输出电压检测可调电压输出应用电路

产品功能框图



**最大耐压值** (Note 1)

VIN 至 GND	-0.3V to 7V
VOUT, EN 至 GND	-0.3V to 6V
VOUT 至 VIN	-6V to 0.3V
封装热阻 (Note 2)	
SOT-23-5, $\theta_{JA}$	200°C /W
DFN2x2-6L $\theta_{JA}$	95°C /W
引脚焊锡温度 (Soldering, 10 sec.)	260°C
结点温度	150°C
存储温度范围	-60°C to 150°C
ESD 静电	
HBM	2KV
MM	200V
CDM	2KV

**建议应用条件**

输入电压 VIN	1.2V to 6V
应用结温范围	40°C to 125°C
应用环温范围	40°C to 85°C

**电气特性** ( $V_{IN} = 5V, V_{EN} = 5V, T_A = 25^{\circ}C$  除另有说明外)

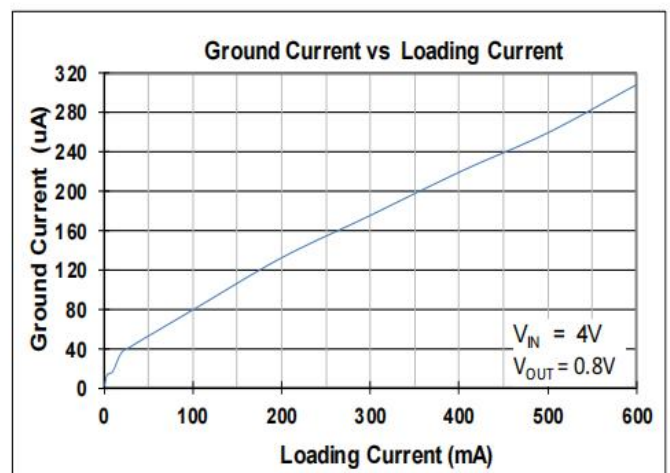
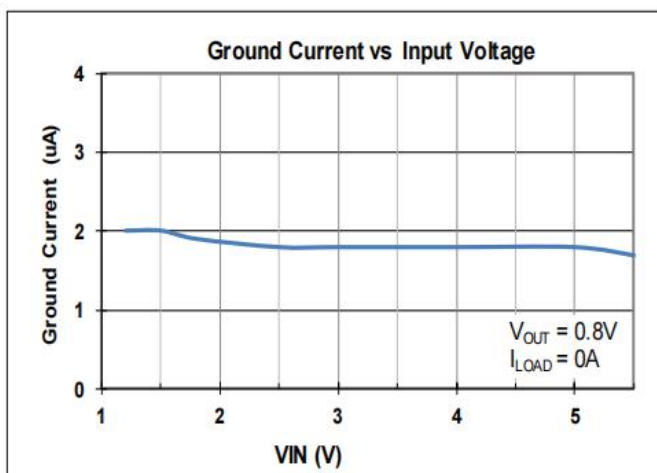
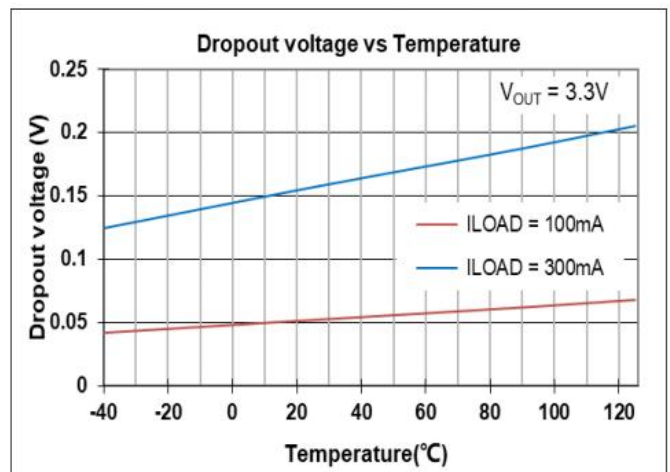
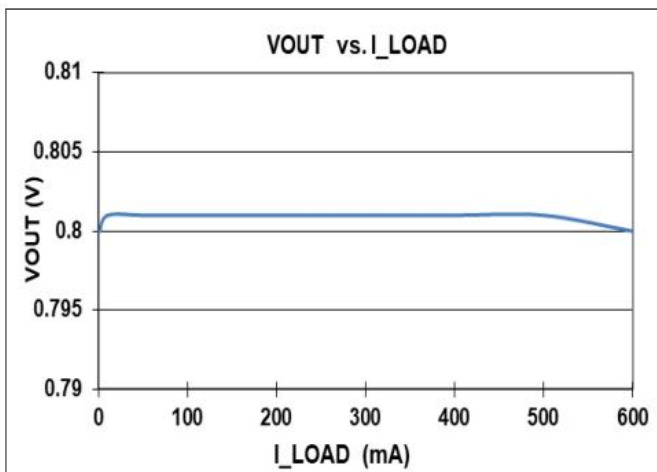
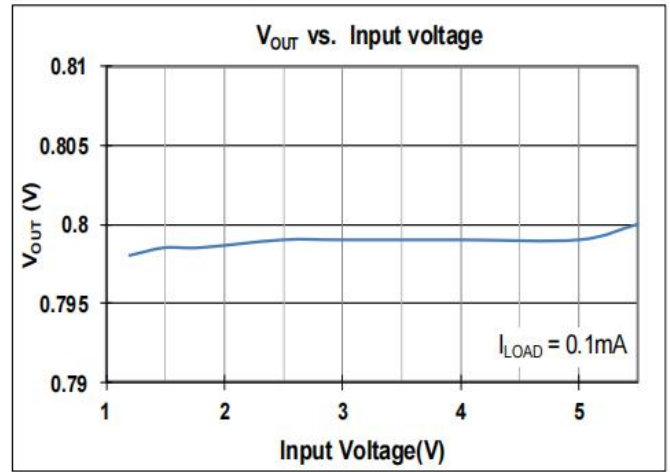
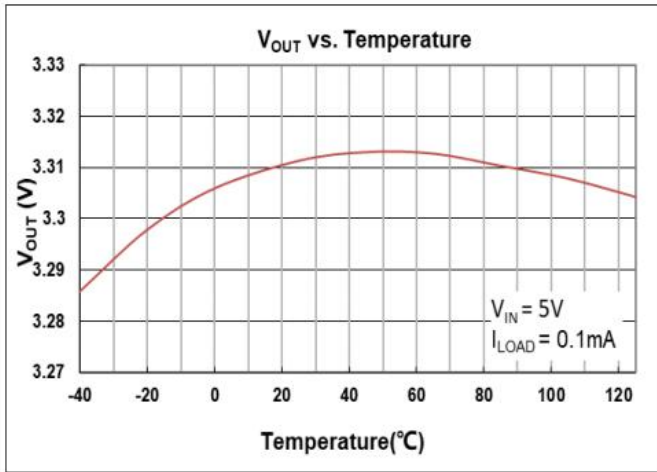
参数	符号	测试条件	最小值	典型值	最大值	单位	
输入电压	$V_{IN}$		1.2	--	6.0	V	
输出电压精准度		$I_{LOAD} = 0.1mA$	-2		2	%	
SNS 输入电流	$I_{SNS}$	$SNS = V_{OUT}$		0.7		$\mu A$	
Dropout 电压 ( $I_{LOAD} = 600mA$ ) (Note 3)	$V_{DROP\_3V}$	$V_{OUT} \geq 3V$		0.32		V	
	$V_{DROP\_2.8V}$	$V_{OUT} = 2.8V$		0.36			
	$V_{DROP\_2.5V}$	$V_{OUT} = 2.5V$		0.36			
	$V_{DROP\_1.8V}$	$V_{OUT} = 1.8V$		0.57			
	$V_{DROP\_1.5V}$	$V_{OUT} = 1.5V$		0.71			
	$V_{DROP\_1.2V}$	$V_{OUT} = 1.2V$		0.8			
	$V_{DROP\_0.8V}$	$V_{OUT} = 0.8V$		1.1			
静态电流	$I_Q$	$I_{LOAD} = 0mA$		2		$\mu A$	
关闭电流	$I_{SD}$	$V_{EN} = 0V, V_{OUT} = 0V$		0.01	0.5	$\mu A$	
使能电压阈值	$V_{IH}$	EN Rising	1.7			V	
	$V_{IL}$	EN Falling			0.6		
EN 输入电流	$I_{EN}$	$V_{EN} = 5V$		10	100	nA	
输入电压调整率	$\Delta LINE$	$I_{LOAD} = 30mA,$ $1.5V \leq V_{IN} \leq 5.5V$ or $(V_{OUT} + 0.2V) \leq V_{IN} \leq 5.5V$		0.2		%	
负载电压调整率	$\Delta LOAD$	$10mA \leq I_{LOAD} \leq 0.3A$		0.2		%	
输出电流限流值	$I_{LIM}$	$V_{OUT} = 0V$	601	1100		mA	
电源抑制比 ( $I_{LOAD} = 5mA$ )	PSRR	$V_{OUT} = 1.2V,$ $V_{IN} = 2V$	$f = 100Hz$	--	80	--	dB
			$f = 1kHz$	--	75	--	
输出电流噪声 ( $BW = 10Hz$ to $100kHz,$ $C_{OUT} = 1\mu F,$ )		$V_{IN} = 3.5V,$ $I_{LOAD} = 0.1A$	$V_{OUT} = 0.9V$	--	40	--	$\mu V_{RMS}$
			$V_{OUT} = 2.8V$	--	70	--	
过温度关断温度	$T_{SD}$	$I_{LOAD} = 10mA$	--	155	--	$^{\circ}C$	
过温度关断迟滞	$\Delta T_{SD}$		--	15	--	$^{\circ}C$	
放电电阻	$R_{DC}$	$EN = 0V, V_{OUT} = 0.1V$	--	80	--	$\Omega$	

**Note 1.** 任何超过“最大耐压值”的应用可能会导致芯片遭受永久性损坏。这些是额定最大耐压值，仅表示在这个范围内芯片不会损伤，但不保证所有性能指标都正常，在任何超过“最大耐压值”的场合使用，都可能导致芯片永久性损坏。在接近或等于最大耐压值情况下使用，可能会影响产品可靠性。

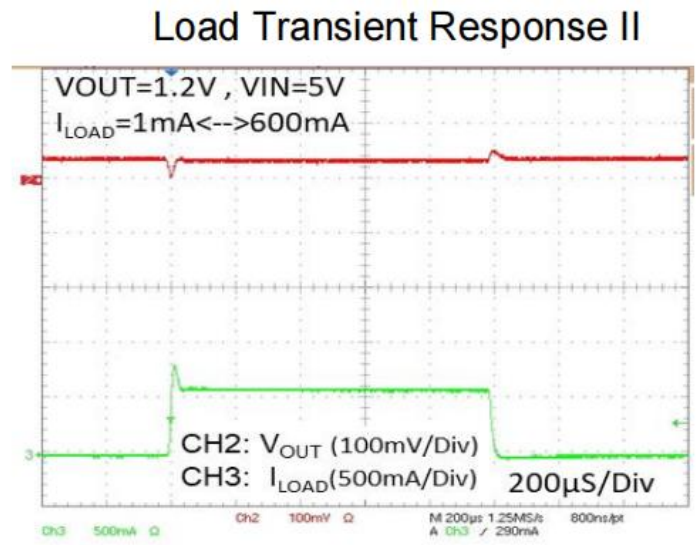
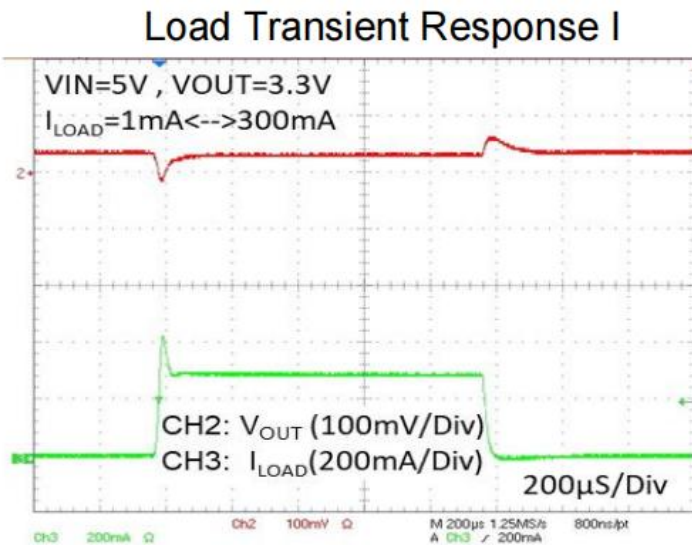
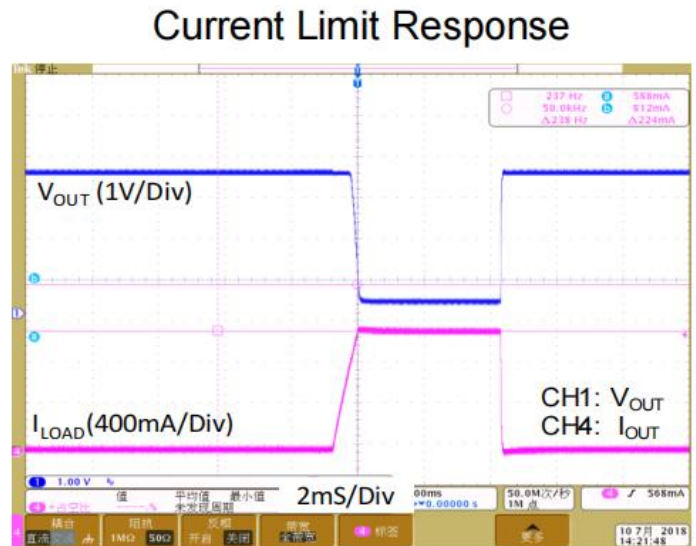
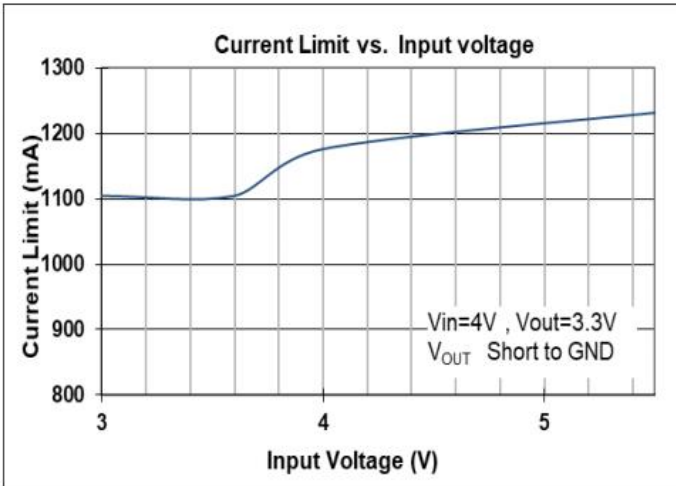
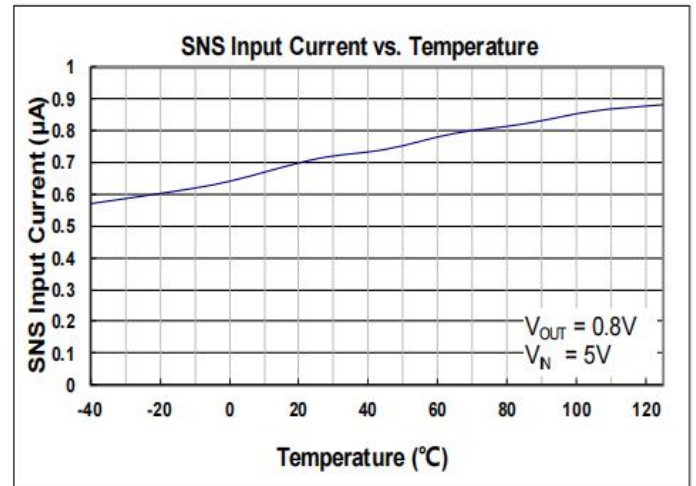
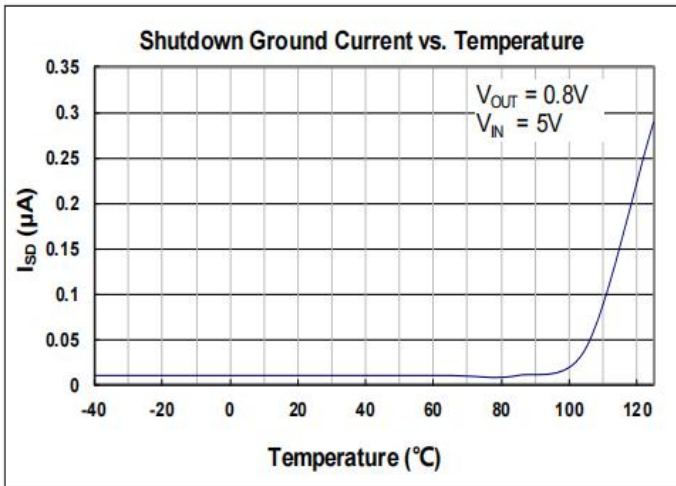
**Note 2.**  $\theta_{JA}$  测量条件:  $T_A = 25^{\circ}C$ , 使用 EVB 板。

**Note 3.**  $V_{DROP} = V_{IN} - V_{OUT}$  ( $V_{OUT}$  达到 98%标准值)。

典型电气特性

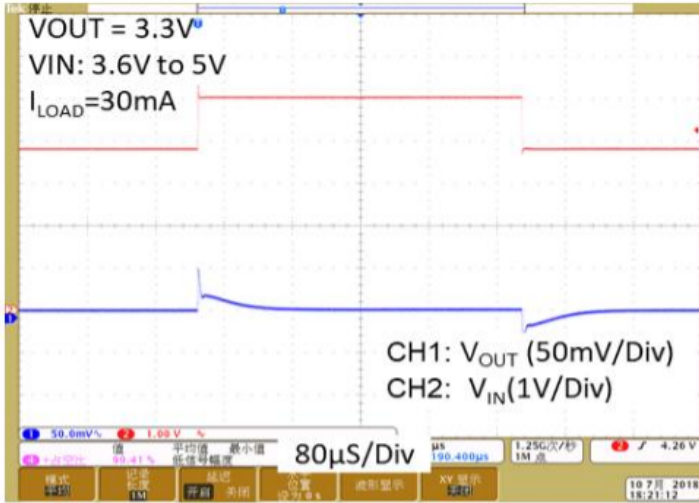


静态电流 2 $\mu$ A, 输出电流 600mA 低压降线性降压转换

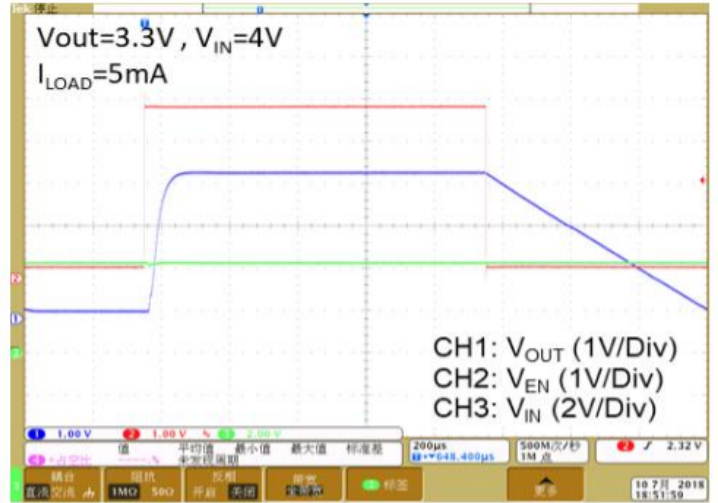


静态电流 2 $\mu$ A, 输出电流 600mA 低压降线性降压转换

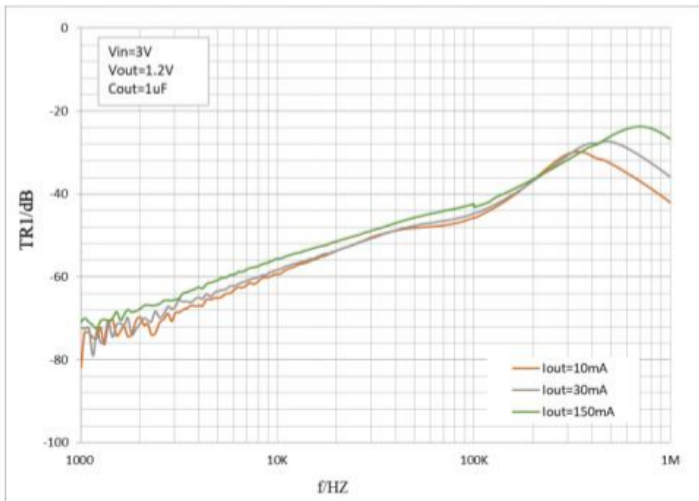
Line Transient Response



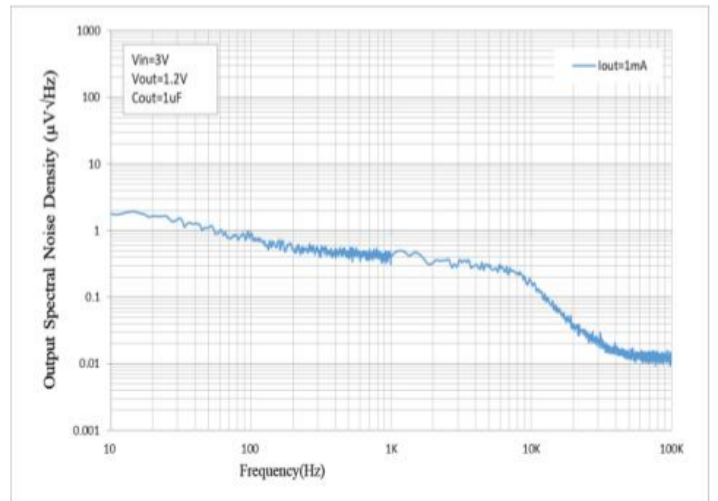
V<sub>OUT</sub> Turn On/Off by EN



PSRR vs. Frequency



Noise Density Spectrum



## 应用指导

### 输入和输出电容

TLV757P 系列产品应用, 需要选择合适的输入电容和输出电容, 以确保产品应用获得稳定可靠的性能。使用 1 $\mu$ F 或者更大容值的输入电容, 并将其靠近 IC 的 VIN 和 GND pin脚摆放。输出电容可选用1m $\Omega$ 以上 ESR (等效串联阻抗), 有效容值 1 $\mu$ F 至 22 $\mu$ F 的电容。并将输出电容靠近IC的V<sub>OUT</sub> 和GND脚摆放。增加输出电容的容值和降低 ESR能够提升电路的PSRR和瞬态响应能力。

### 电流限制功能

TLV757P 系列产品内部的电流限制器可持续监控及控制 输出功率晶体管, 将输出电流限制至1100mA(典型值)。限流功能确保输出可以短路至地, 器件不会损坏。

### Dropout 电压

TLV757P 系列采用 PMOS 传输晶体管来实现低压差。当( V<sub>IN</sub> - V<sub>OUT</sub> ) 小于(V<sub>DROP</sub>)时, PMOS 晶体管处于线性工作区域, 输入至输出阻抗即为PMOS的R<sub>DS(ON)</sub> , 在此状态下, PMOS 等效于一颗电阻, V<sub>DROP</sub>和输出电流近似成比例。和其他线性电压转换器一样, TLV757P 系列的PSRR和瞬态响应能力会随着( V<sub>IN</sub> - V<sub>OUT</sub> )压差接近 V<sub>DROP</sub> 而下降。

### OTP (过温度保护)

当产品的结点温度超过 155 $^{\circ}$ C (典型值) 时, TLV757P 会关闭 P-MOS 关闭输出。当结点温度往回降大约 15 $^{\circ}$ C 时, TLV757P 会重新自动重启工作。

## 热散功率

持续工作时, IC 的结点温度不应超过其额定值。最大的热散功率取决于 IC 封装的热阻、PCB 布图、周围气流速率以及结点和环境温度的差异。最大热散功率计算如下:

环温  $T_A = 25^\circ\text{C}$ , 使用 PCB,

SOT-23-5 封装:

$$PD(\text{Max}) = (125^\circ\text{C} - 25^\circ\text{C}) / (200^\circ\text{C}/\text{W}) = 0.5\text{W}$$

DFN2x2-6L 封装:

$$PD(\text{Max}) = (125^\circ\text{C} - 25^\circ\text{C}) / (95^\circ\text{C}/\text{W}) = 1.05\text{W}$$

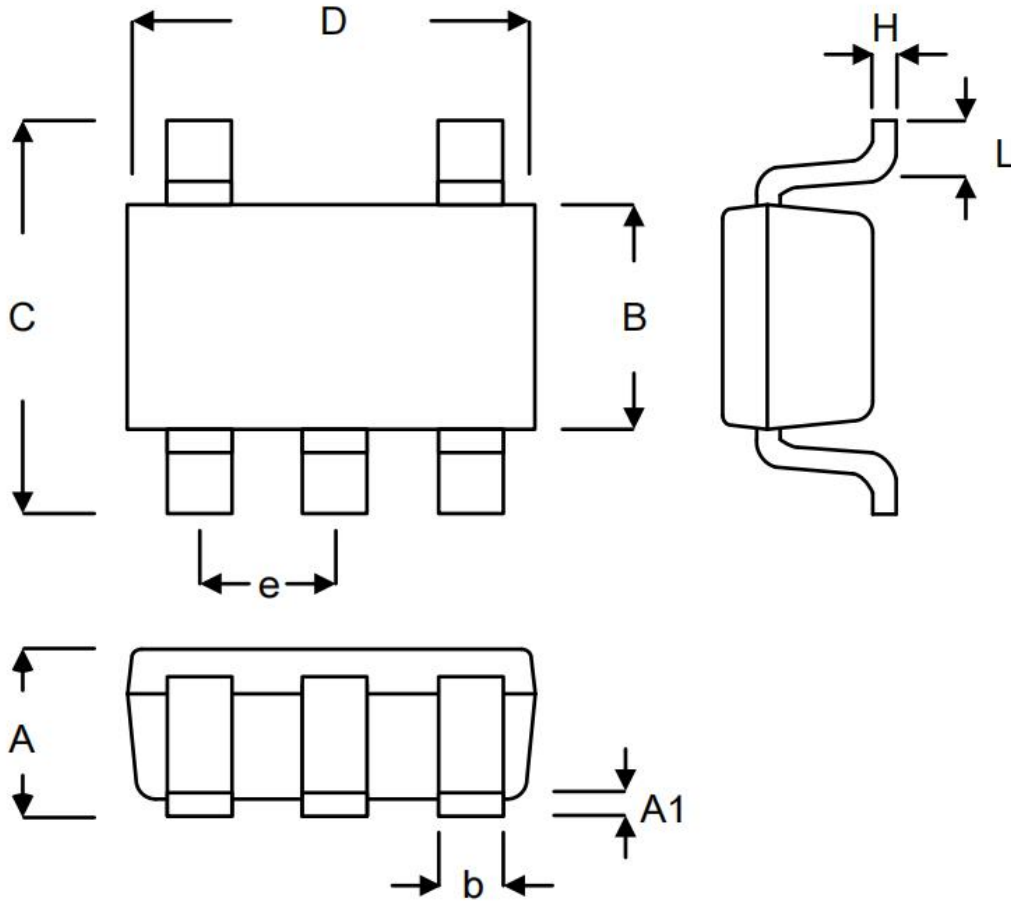
热散功率(PD)等于输出电流和 LDO 上的压降的乘积, 计算公式如下:

$$PD = (V_{IN} - V_{OUT}) \times I_{OUT}$$

## Layout 注意事项

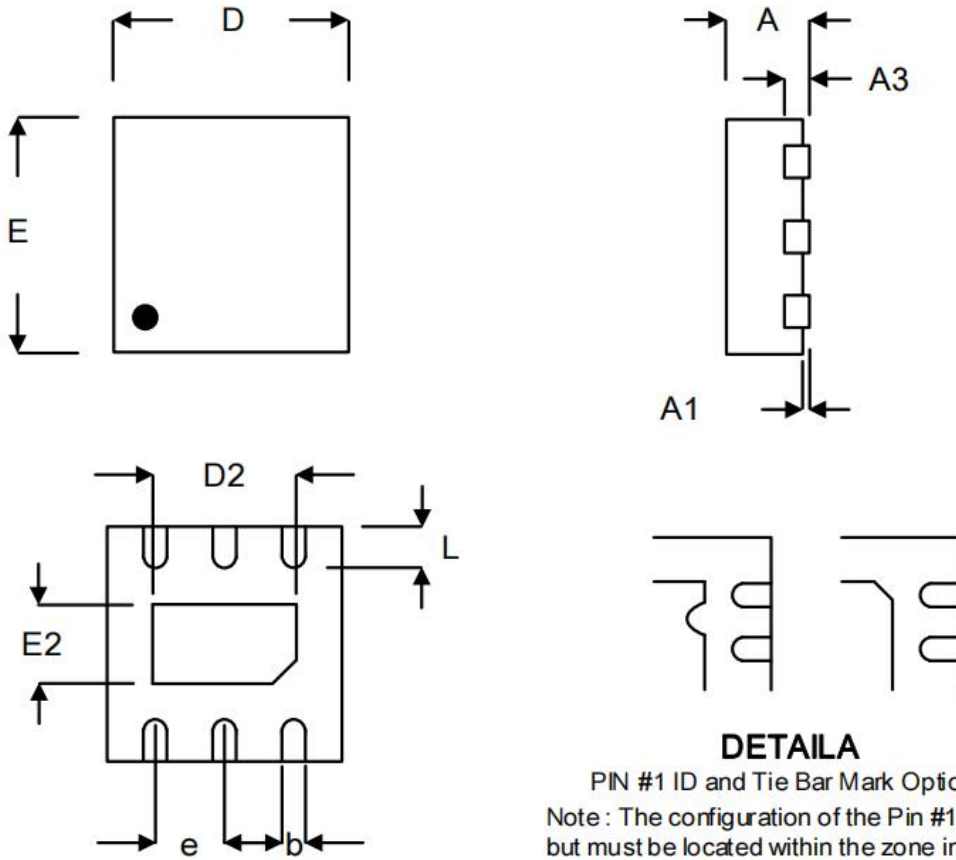
将输入电容、输出电容和 LDO 放置在 PCB 的同一面, 并尽量将电容器靠近 IC 的输入输出脚摆放, 可实现电路最佳性能。输入电容和输出电容的接地连接必须拉回到 TLV757P 的接地引脚, 并使用短而粗的铺线连接。避免使用长走线、窄走线、或者通过过孔走线, 这些会增加寄生电感和电阻, 导致电路性能变差, 特别是在瞬态工作条件下。

封装信息



Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.889	1.295	0.035	0.051
A1	0.000	0.152	0.000	0.006
B	1.397	1.803	0.055	0.071
b	0.250	0.560	0.010	0.022
C	2.591	2.997	0.102	0.118
D	2.692	3.099	0.106	0.122
e	0.838	1.041	0.033	0.041
H	0.080	0.254	0.003	0.010
L	0.300	0.610	0.012	0.024

SOT-23-5L



Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.175	0.250	0.007	0.010
b	0.200	0.350	0.008	0.014
D	1.950	2.050	0.077	0.081
D2	1.000	1.450	0.039	0.057
E	1.950	2.050	0.077	0.081
E2	0.500	0.850	0.020	0.033
e	0.650		0.026	
L	0.300	0.400	0.012	0.016

**DFN2x2-6L**

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