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SEMICONDUCTOR



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PLED

TLV700XXDDCR-MS

产品手册

产品描述

TLV700XXDDCR-MS 系列是一组低压差（LDO）转换器，具有 1.2V 至 5.5V 宽电压输入范围、低压差、低功耗和小型化封装的等特性。

TLV700XXDDCR-MS 低至 2uA 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。

TLV700XXDDCR-MS 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 100nA （典型值）。TLV700XXDDCR-MS 系列支持输出电容采用陶瓷电容器 ，在 1.2V 至 5.5V 的宽输入电压范围内和整个输出负载电流 0mA-300mA 范围内稳定工作。

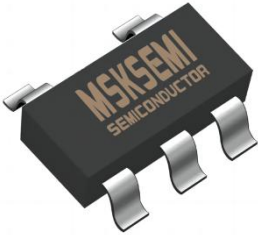
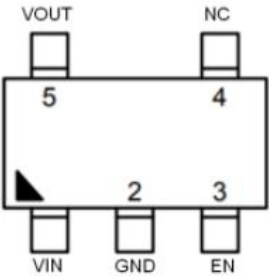
产品特性

- 2uA 静态电流（无负载）
- ±2%输出电压精度
- 300mA 输出电流能力
- 100nA 关断电流(可选版本)
- 宽范围输入电压：1.2V 至 5.5V
- 低压差：0.18V（Vo=3.3V/Io=300mA 条件下）
- 支持固定输出电压：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

产品应用

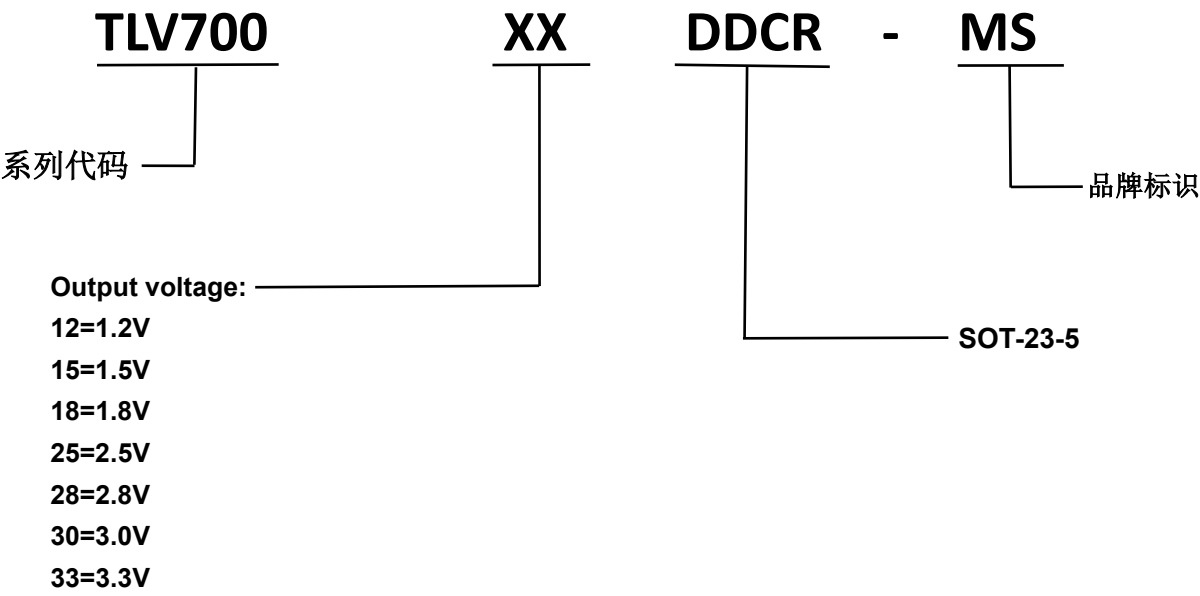
- 手持式、电池供电设备
- 低功耗微处理器
- 笔记本电脑、掌上型电脑和 PDA
- 无线通讯设备
- 音频/视频设备
- 车载导航系统

Reference News&Marking

SOT-23-5	Pin Configurations
	

TLV70012DDCR-MS	TLV70015DDCR-MS
AADB ****	AADG ****
TLV70018DDCR-MS	TLV70025DDCR-MS
AABB ****	AAET ****
TLV70028DDCR-MS	TLV70030DDCR-MS
AAC6 ****	AADC ****
TLV70033DDCR-MS	
AAC7 ****	

Part Number Code



引脚功能描述

脚位号	名称	功能描述
2	GND	接地
5	VOUT	电压输出端口
1	VIN	电源输入端口
3	EN	使能控制
4	NC	浮空脚

订购信息

订单型号	封装形式	包装/数量
TLV70012DDCR-MS	SOT-23-5	盘装/3000pcs
TLV70015DDCR-MS	SOT-23-5	盘装/3000pcs
TLV70018DDCR-MS	SOT-23-5	盘装/3000pcs
TLV70025DDCR-MS	SOT-23-5	盘装/3000pcs
TLV70028DDCR-MS	SOT-23-5	盘装/3000pcs
TLV70030DDCR-MS	SOT-23-5	盘装/3000pcs
TLV70033DDCR-MS	SOT-23-5	盘装/3000pcs

典型应用电路

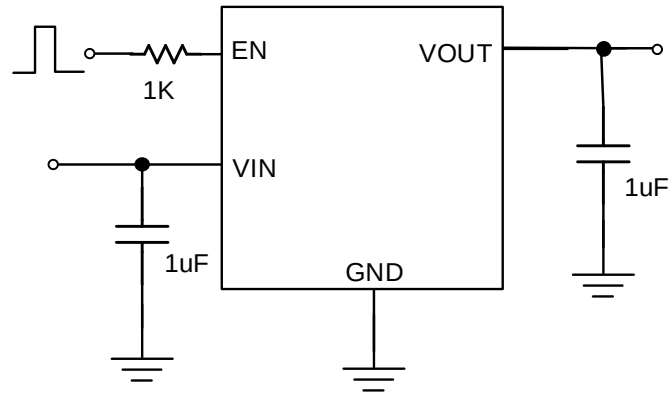
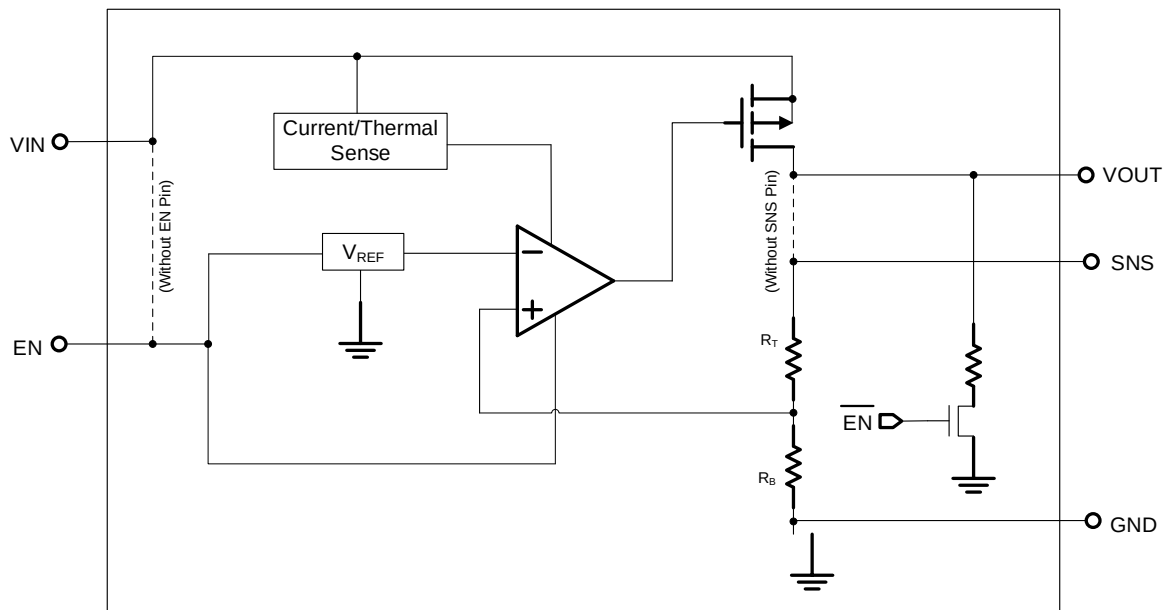


图 1：带使能脚的固定输出应用电路

产品功能框图



电气特性

(V_{IN} = 5V, V_{EN} = 5V T_A = 25°C 除另有说明外)

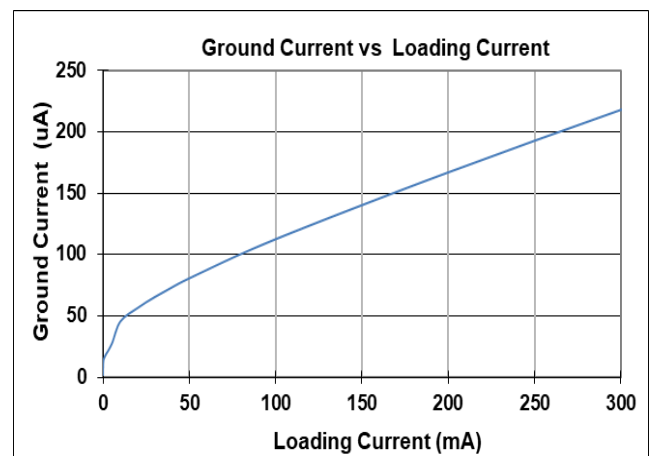
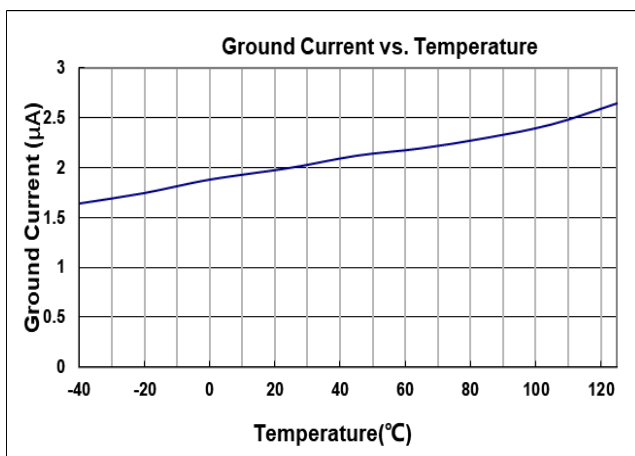
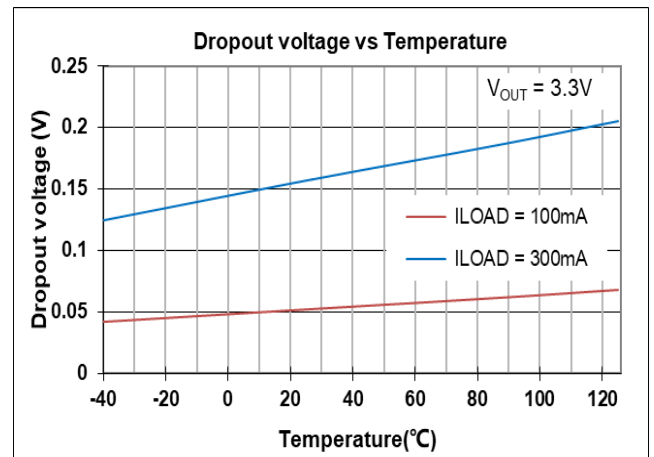
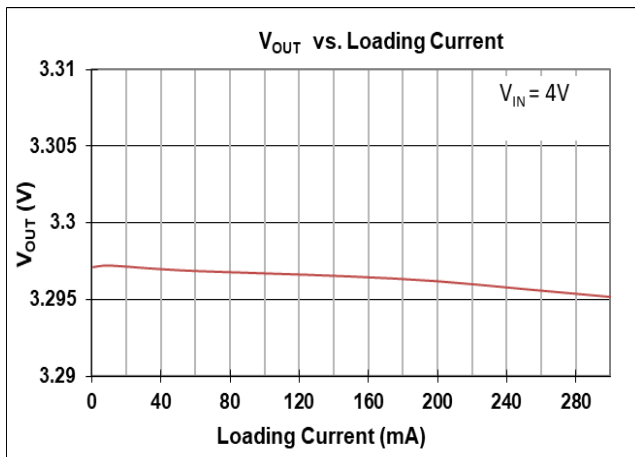
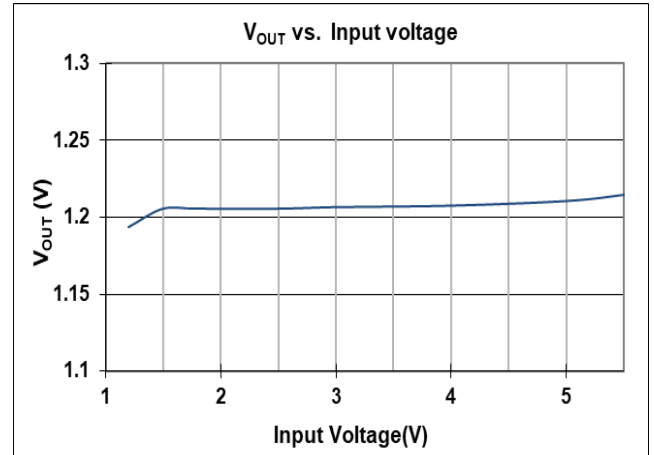
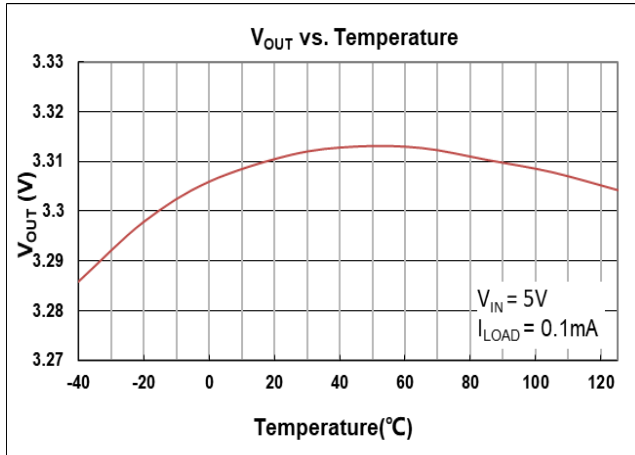
参数	符号	测试条件	最小值	典型值	最大值	单位
输入电压	V _{IN}		1.2	--	5.5	V
输出电压精准度		I _{LOAD} = 0.1mA	-2		2	%
SNS 输入电流	I _{SNS}	SNS = V _{OUT}		0.5		μA
Dropout 电压 (I _{LOAD} = 300mA) (Note 3)	V _{DROP_3V}	V _{OUT} ≥ 3V		0.18		V
	V _{DROP_2.8V}	V _{OUT} = 2.8V		0.23		
	V _{DROP_2.5V}	V _{OUT} = 2.5V		0.23		
	V _{DROP_1.8V}	V _{OUT} = 1.8V		0.28		
	V _{DROP_1.5V}	V _{OUT} = 1.5V		0.36		
	V _{DROP_1.2V}	V _{OUT} = 1.2V		0.45		
静态电流	I _Q	I _{LOAD} = 0mA		2		μA
关闭电流	I _{SD}	V _{EN} = 0V, V _{OUT} = 0V		0.1	0.5	μA
使能电压阈值	V _{IH}	EN Rising	1.0			V
	V _{IL}	EN Falling			0.4	
EN 输入电流	I _{EN}	V _{EN} = 5V		10	100	nA
输入电压调整率	ΔLINE	I _{LOAD} = 30mA, 1.5V ≤ V _{IN} ≤ 5.5V or (V _{OUT} + 0.2V) ≤ V _{IN} ≤ 5.5V		0.2		%
负载电压调整率	ΔLOAD	10mA ≤ I _{LOAD} ≤ 0.3A		0.2		%
输出电流限流值	I _{LIM}	V _{OUT} = 0V	301	600		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} = 1μF,)		V _{IN} = 3.5V I _{LOAD} = 0.1A	V _{OUT} = 1.2V	--	80	μV _{RMS}
			V _{OUT} = 2.8V	--	120	
过温度关断温度	T _{SD}	I _{LOAD} = 10mA	--	155	--	°C
过温度关断迟滞	ΔT _{SD}		--	15	--	°C
放电电阻	R _{DC}	EN = 0V, V _{OUT} = 0.1V	--	30	--	Ω

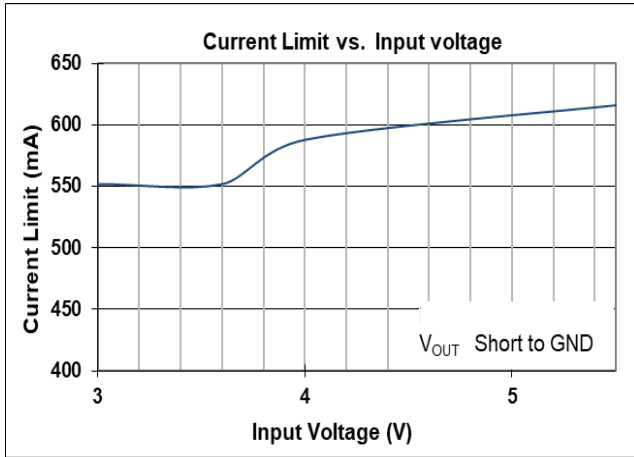
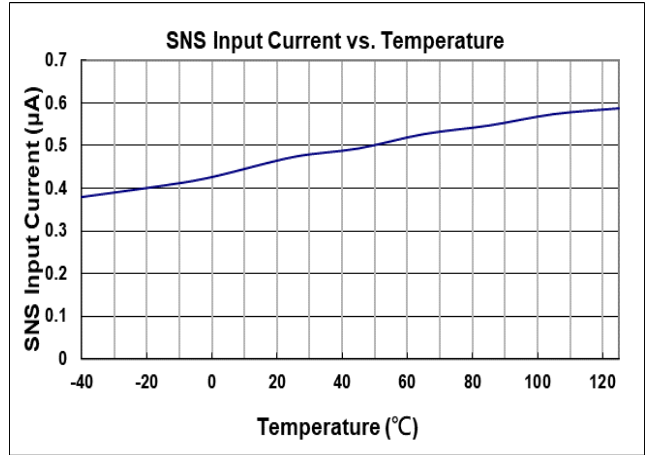
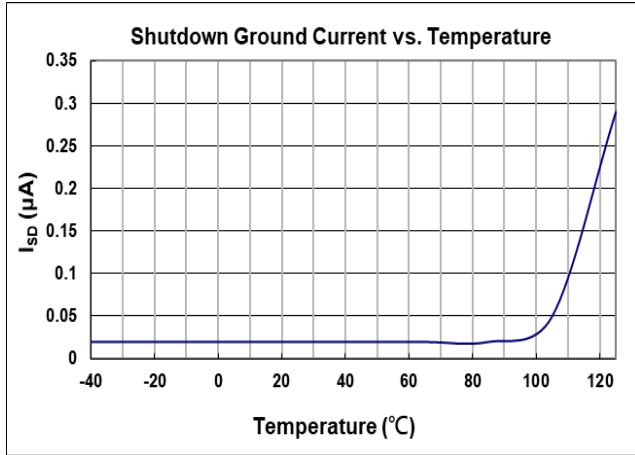
Note 1. 任何超过“最大耐压值”的应用可能会导致芯片遭受永久性损坏。这些是额定最大耐压值，仅表示在这个范围内芯片不会损伤，但不保证所有性能指标都正常，在任何超过“最大耐压值”的场合使用，都可能导致芯片永久性损坏。在接近或等于最大耐压值情况下使用，可能会影响产品可靠性。

Note 2. θ_{JA} 测量条件：T_A = 25°C，使用 EVB 板。

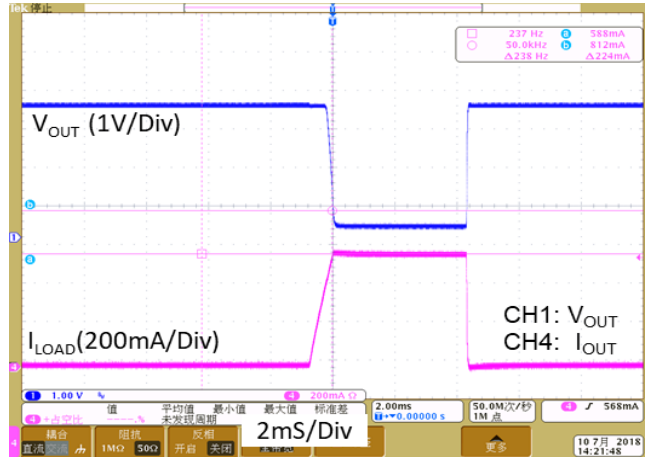
Note 3. V_{DROP} = V_{IN} - V_{OUT} (V_{OUT} 达到 98%标准值)。

典型电气特性

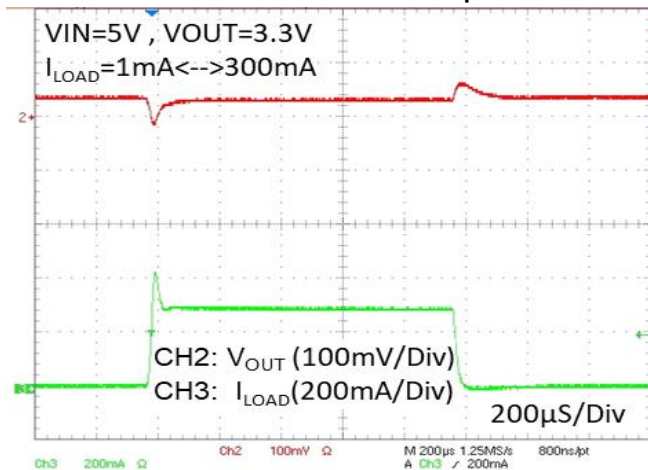




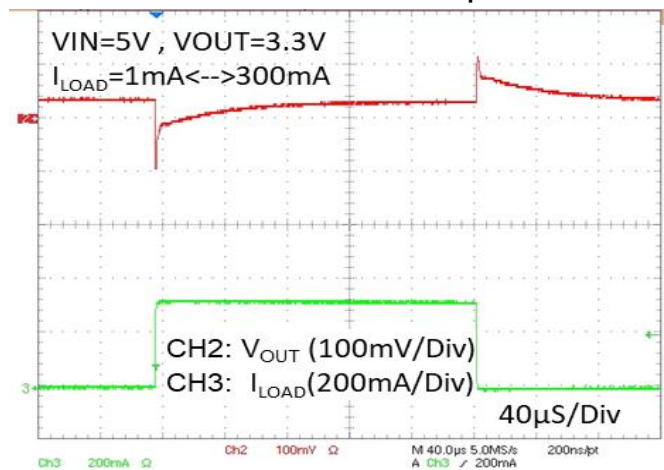
Current Limit Response



Load Transient Response I



Load Transient Response II



应用指导

输入和输出电容

TLV700XXDDCR-MS 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 1uF 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 1mΩ以上 ESR (等效串联阻抗), 有效容值 1uF 至 22uF 的电容。并将输出电容靠近 IC 的 V_{OUT} 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。

Dropout 电压

TLV700XXDDCR-MS 系列采用 PMOS 传输晶体管来实现低压差。当 $(V_{IN} - V_{OUT})$ 小于 (V_{DRO}) 时, PMOS 晶体管处于线性工作区域, 输入至输出阻抗即为 PMOS 的 $R_{DS(ON)}$, 在此状态下, PMOS 等效于一颗电阻, V_{DRO} 和输出电流近似成比例。和其他线性电压转换器一样, TLV700XXDDCR-MS 系列的 PSRR 和瞬态响应能力会随着 $(V_{IN} - V_{OUT})$ 压差接近 V_{DRO} 而下降。

电流限制功能

TLV700XXDDCR-MS 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 600mA (典型值)。限流功能确保输出可以短路至地, 器件不会损坏。

OTP (过温度保护)

当产品的结点温度超过 155°C (典型值) 时, TLV700XXDDCR-MS 会关闭 P-MOS 关闭输出。当结点温度往回降大约 15°C 时, TLV700XXDDCR-MS 会重新启动工作。

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 M S K S E M I PCB,

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

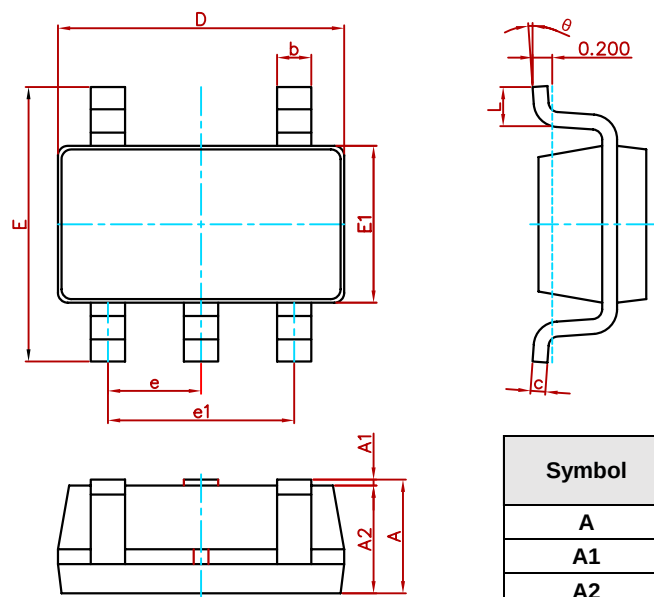
热散功率(PD)等于输出电流和 LDO 上的压降的乘积, 计算公式如下:

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

Layout 注意事项

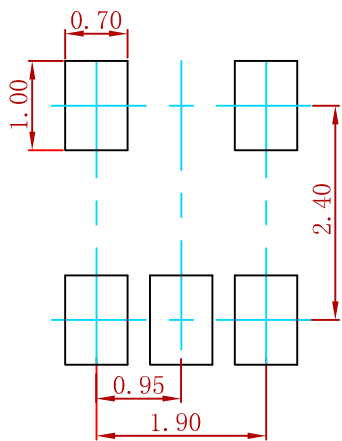
将输入电容、输出电容和 LDO 放置在 PCB 的同一面, 并尽量将电容器靠近 IC 的输入输出脚摆放, 可实现电路最佳性能。输入电容和输出电容的接地连接必须拉回到 TLV700XXDDCR-MS 的接地引脚, 并使用短而粗的铺线连接。避免使用长走线、窄走线、或者通过过孔走线, 这些会增加寄生电感和电阻, 导致电路性能变差, 特别是在瞬态工作条件下。

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
E	2.650	2.950	0.104	0.116
E1	1.500	1.700	0.059	0.067
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°

Suggested Pad Layout



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

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