

## 7 W (DVB-T)电源

应用	器件	输出功率	输入电压	输出电压	拓扑结构
DVB-T	TOP242PN	7 W	195 – 265 VAC	2.5 V / 3.3 V / 6.2 V / 30 V	反激式

### 设计特色

- 在输出地线接到地面的情况下满足CISPR22B/EN55022B传导EMI限制
- 空载功耗<0.5 W
- 132 kHz操作频率和可设定的电流限流点允许使用体积小、成本低的EF16变压器来输出7 W功率
- 元件数量少，PCB尺寸为80 × 30 × 16 mm
- 集成的软启动功能减小了启动时的元件应力

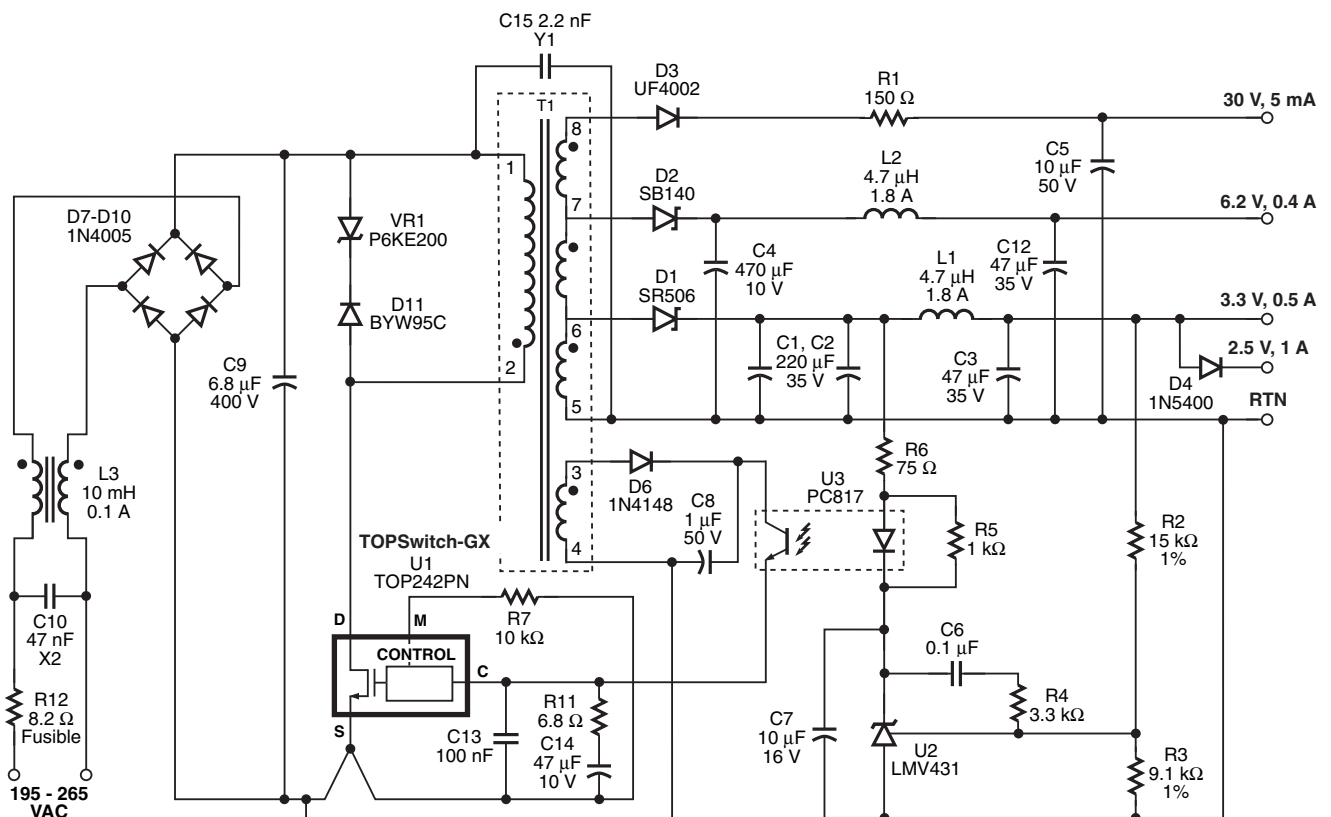
### 工作方式

此TOPSwitch-GX反激式电源输入电压为230 VAC±15%，输出为4路，功率为7 W。芯片使用低成本的DIP-8封装TOP242PN，不需要外加散热片。电阻R7将TOP242PN的限流点设定为标称值的78%，刚刚超过达到低压满载时所需的值。这种特性允许变压器

设计在更连续的状态，在不需要更大磁芯尺寸的情况下取得更好的效率和交叉调整率。

R12、C10和L2进行传导EMI滤波；R12是防火可熔型，也做保险丝用。如果电源不需要满足输出地线接大地的传导EMI测试，为了降低成本，共模电感可以一个π型滤波代替。为了空载功耗更低，用齐纳箝位（D11和VR1）代替RCD箝位。由于3.3 V偏差要求最严格（±5%），次级反馈取自3.3 V输出。2.5 V±5%的输出通过D4接到3.3 V来实现。D1用60 V的肖特基，它的正向压降稍微高一点可以使6.2 V和30 V的输出在中心值。

二次滤波（L1/C3，L2/C12和R1/C5）衰减输出噪音和纹波，使其小于各自输出电压值的±1%。软启动电容（C7）消除了输出开机过冲。



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图1. TOPSwitch-GX 7 W DVB-T多输出电源

### 设计要点

- 为了使次级交叉调整率好，变压器设计在电流连续操作方式。
- Y1安规电容C15接在初级直流高压端和次级地线，在交流输出共模浪涌时噪音耦合最小。
- 遵循如下的布板经验：
  - C13、R11和C14靠近U1，地线回到源极脚。
  - 使初级和次级环路面积最小，降低寄生漏感，改进EMI和交叉调整率。

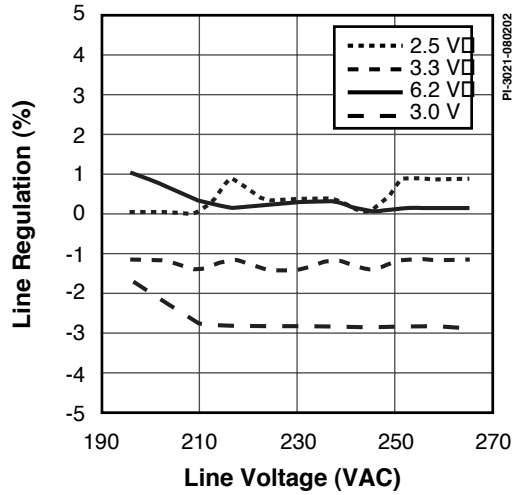


图2. 满载输入调整率

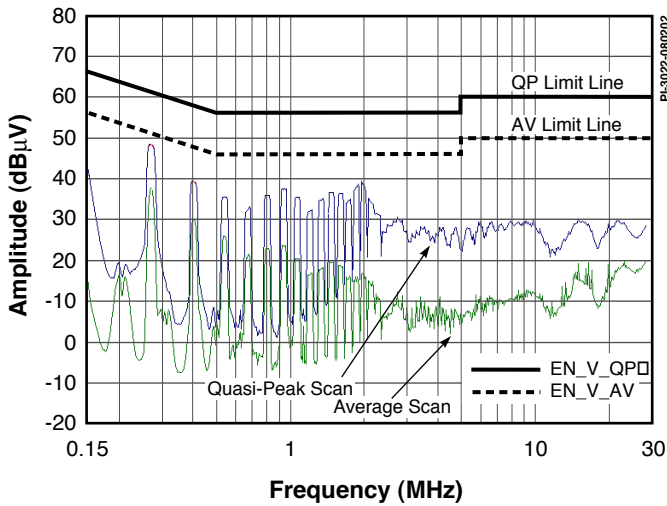


图3. 传导EMI, 230 V满载, 输出接大地

### 变压器参数

磁芯材料	EF16, gapped for 190 nH/t <sup>2</sup>
骨架	EF16-8 pin
绕组细节	Primary: 105T, 35 AWG Bias: 17T, 35 AWG 3.3 V Secondary: 4T, 4 × 26 AWG T.I.W. 6.2 V Secondary: 3T, 26 AWG T.I.W. 30 V Secondary: 29T, 30 AWG T.I.W.
绕组顺序 (引脚号)	Primary (1-2), tape, Bias (3-4), tape, 3.3 V (5-6), 5 V (6-7), 30 V (7-8)
电感	Primary: 2.1 mH ±10% Leakage: 50 µH (maximum)
初级谐振频率	650 kHz (minimum)

表1. 变压器结构信息 (AWG = 美国线规, T.I.W. = 三层绝缘线)

电压(V)	负载范围(%)	调整率(%)														
		-10	-7	-4	-3	-2	-1	0	1	2	3	4	7			
3.3	10-100															
5	10-100															
30	10-100															
	100															

表2. 最差情况下的输出调整率 — 所有输出从最小到最大负载

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