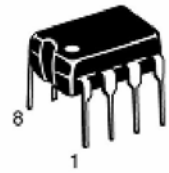




概述:

UC3842是专为脱线和 DC-DC 开关电源应用设计的恒频电流型 PWM 控制器。内部包含温度补偿精密基准、供精密占空比调节用的可调振荡器、高增益误差放大器、电流传感比较器和适合作功率 MOSFET 驱动用的大电流推挽输出级以及单周期徊滞式限流欠压锁定、死区可调、单脉冲计数控锁等保护电路。

UC3842采用 DIP8/SOP-8(SOIC-8)的封装形式封装。

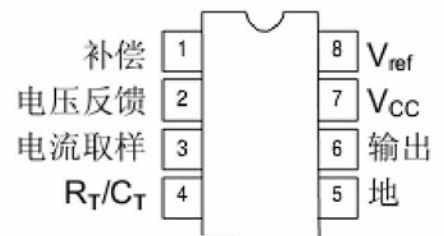


DIP8

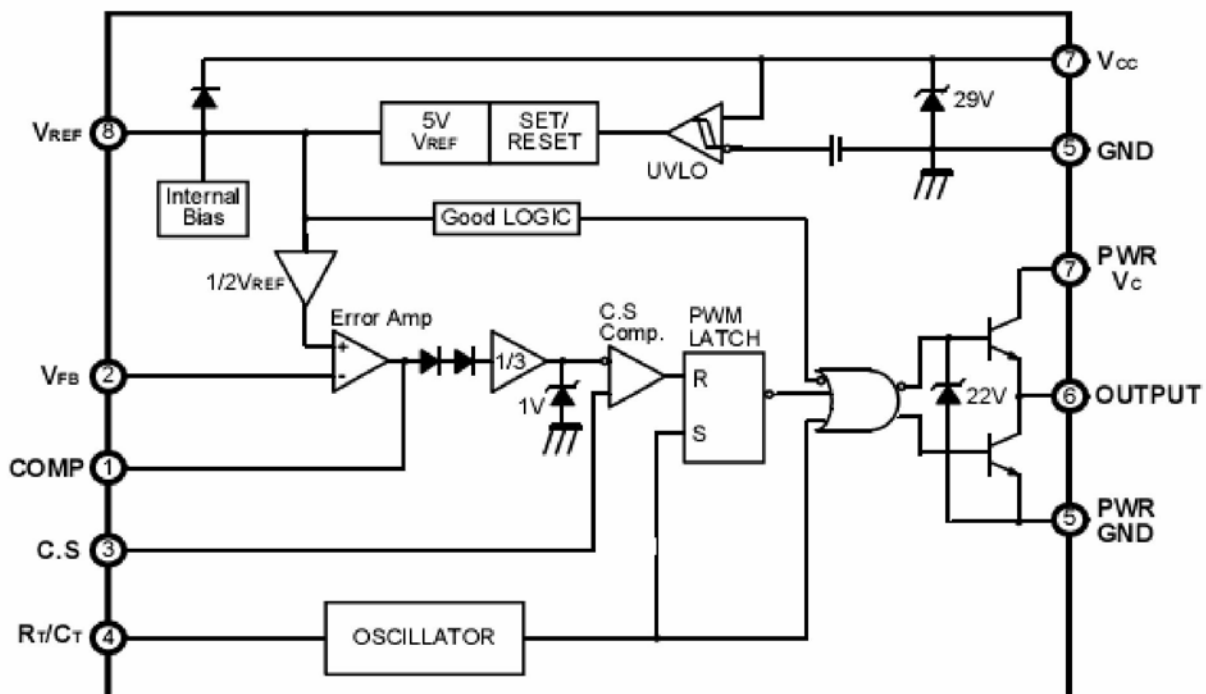
主要特点:

- 起动电流小 (< 0.5mA)
- 自动前馈补偿
- 具有徊滞特性的欠压锁定
- 最大占空比箝制
- 工作频率可达 500kHz

管脚连接图



功能框图





引出端功能说明

引出端序号	功 能	符 号	说 明
1	比较端	COMP	是误差放大器的输出，可以用作回路补偿
2	电压反馈输入	V _{FB}	误差放大器的反相输入，它通常经过一个电阻分压器和开关电源连接
3	电流传感器	Sen	一个和电感线圈的电流成比例的电压连接到这个输入端。PWM 在该端检测到的电压决定输出是否关断
4	振荡端	OSC	将 R _T 和 V _{REF} 相连，将 C _T 和地相连以控制振荡器频率和最大输出占空比。最高频率可达 500kHz
5	地	GND	地
6	输出	OUTPUT	输出直接驱动功率 MOSFET 的栅极。高达 1A 的峰值电流可由此脚输出或吸入。
7	电源	V _{CC}	控制集成电路的正电流
8	基准电压	V _{REF}	基准电压的输出。它经过电阻器 R _T 为电容器 C _T 提供充电电流

极限值（绝对最大额定值，若无其它规定，T_{amb}=25℃）

参 数 名 称	符 号	数 值		单 位
		最 小	最 大	
电源电压	V _{CC}		30	V
输出电流	I _o	-1	1	A
输出能量	W		5.0	μJ
误差放大器输出吸电流	I _o		10	mA
电流传感和电压反馈输入	V _{in}	-0.3	5.5	V
工作结温	T _j		150	℃
功耗	P _D		1	W
工作环境温度	T _{amb}	0	70	℃
贮存温度	T _{stg}	-55	150	℃

电特性（若无其它规定，V_{CC}=15V，T_{amb}=0~70℃，R_T=10kΩ，C_T=3.3nF）

特 性	测 试 条 件	符 号	规 范 值			单 位
			最 小	典 型	最 大	
基准部分						
基准输出电压	T _j =25℃ I _o =1mA	V _{ref}	4.90	5.00	5.10	V
线性调整率	12V ≤ V _i ≤ 25V	ΔV _{ref}		6	20	mV
负载调整率	1mA ≤ V _i ≤ 20mA	ΔV _{ref}		6	25	mV
输出噪声电压	10Hz ≤ f ≤ 10kHz	e _n		50		μV
短路输出电流	T _a =25℃	I _{sc}	-30	-100	-180	mA



电特性 (若无其它规定, $V_{CC}=15V$, $T_{amb}=0\sim 70^{\circ}C$, $R_T=10k\Omega$, $C_T=3.3nF$)

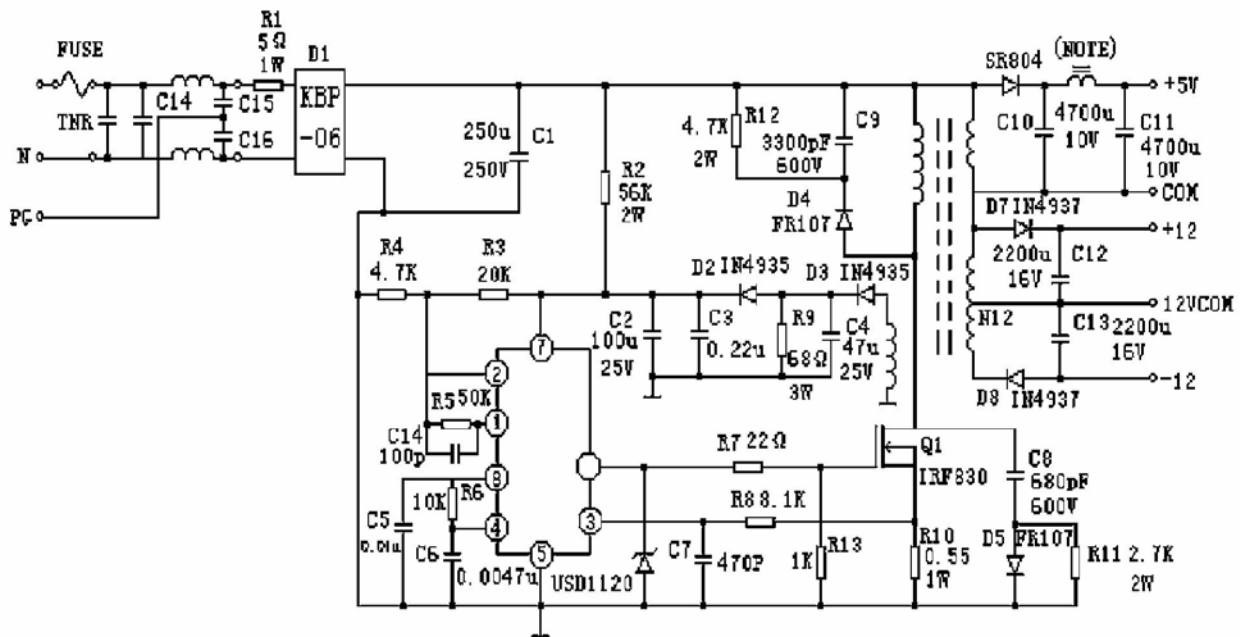
特性	测试条件	符号	规范值			单位
			最小	典型	最大	
振荡器部分						
振荡频率	$T_j=25^{\circ}C$	fosc	47	52	57	kHz
振荡电压特性	$V_{CC}=12V$ to $25V$	$\Delta f_{osc}/\Delta V$	-	0.2	1	%
振荡温度特性	$T_a=T_{low}$ to T_{high}	$\Delta f_{osc}/\Delta T$	-	5	-	%
振荡幅度	peak to peak	Vosc	-	1.6	-	V
放电电流	$T_j=25^{\circ}C$	Idischg	7.8	8.3	8.8	mA
误差放大器部分						
输入电压	$V_{pin1}=2.5V$	Vfb	2.42	2.50	2.58	V
输入偏置电流	$V_{fb}=5V$	Ibias		-0.1	-2	μA
开环电压增益	$2V \leq V_o \leq 4V$	Gvo1	65	90		dB
单位增益带宽	$T_j=25^{\circ}C$	BW	0.7	1		MHz
电源纹波抑制比	$12V \leq V_i \leq 25V$	PSRR	60	70		dB
输出灌电流	$V_{pin2}=2.7V, V_{pin1}=1.1V$	Isink	2	12		mA
输出吸电流	$V_{pin2}=2.3V, V_{pin1}=5V$	Isource	-0.5	-1		mA
输出高电平	$V_{pin2}=2.3V; R_l=15k\Omega$ to Ground	VOH	5	6.2		V
输出低电平	$V_{pin2}=2.7V; R_l=15k\Omega$ to Pin8	VOL		0.8	1.1	V
电流传感部分						
增益	(注 1 & 2)	Gv	2.85	3	3.15	V/V
最大输入信号	$V_{pin1}=5V$ (注 1)	V3	0.9	1.0	1.1	V
电源抑制比	$12V \leq V_i \leq 25V$ (注 1)	SVR		70		dB
输入偏置电流		Ib		-2	-10	μA
传输延迟	电流传感输入到输出	TPLH(in/off)		150	300	ns
输出部分						
输出低电平	Isink=20mA	VOL		0.1	0.4	V
	Isink=200mA			1.6	2.2	V
输出高电平	Isource=20 mA	VOH	13	13.5		V
	Isource=200 mA		12	13.5		V
欠压锁定的输出电压	$V_{CC}=6V, I_{sink}=1mA$	Vols		0.7	1.2	V
输出电压上升时间	$T_j=25^{\circ}C$ $C_l=1nF$ (注 3)	tr		50	150	ns
输出电压下降时间	$T_j=25^{\circ}C$ $C_l=1nF$ (注 3)	tf		50	150	ns
欠压锁定部分						
起动电压		Vth	14.5	16	17.5	V
维持电压		Vcc(min)	8.5	10	11.5	V



电特性 (若无其它规定, $V_{cc}=15V$, $T_{amb}=0\sim70^{\circ}C$, $R_T=10k\Omega$, $C_T=3.3nF$)

特性	测试条件	符号	规范值			单位
			最小	典型	最大	
PWM 部分						
最大占空比		D (max)	94	96	100	%
最小占空比		D (min)		0		%
整个器件						
启动电流	$V_i=14V$	I _{st}		0.12	0.3	mA
工作电源电流	$V_{pin2}=V_{pin3}=0V$	I _i		12	17	mA
Zener 电压	I _i =25mA	V _{iz}	30	36		V

应用电路图



注: 1. 输入电压: 95Vac ~130Vac (50Hz/60Hz)

2. 线形隔离: 3850V

3. 开关频率: 40kHz

4. 效率 : 满负荷 70%

5. 输出电压: A +5V 5%/-5%: 1A~4A 负载, 脉动电压 : 50mVp-pmax

B +12V 3%/-3% : 0.1A~0.3A 负载, 脉动电压 : 100mVp-pmax

C -12V 3%/-3% : 0.1A~0.3A 负载, 脉动电压 : 100mVp-pmax



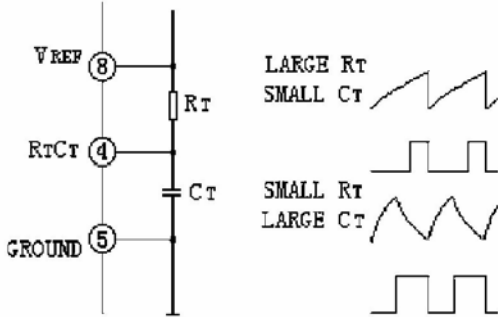
使用说明

1 振荡部分

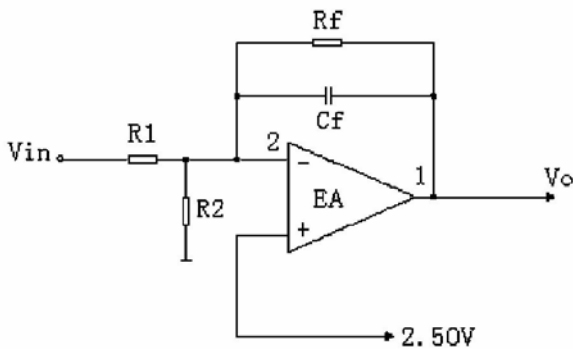
外围元件 R_T 和 C_T 决定振荡频率和最大占空比，如下图所示，充放电时间由下式表示。

充电时间： $t_c=0.55R_T*C_T$

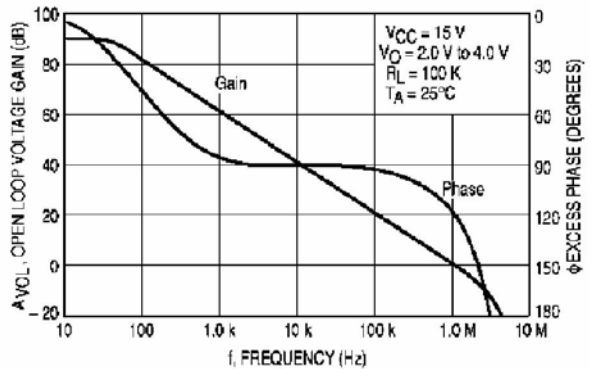
放电时间： $t_a \approx R_T * C_T * \ln\{(0.0063R_T - 2.7)/(0.0063R_T - 4)\}$



2. 误差放大器



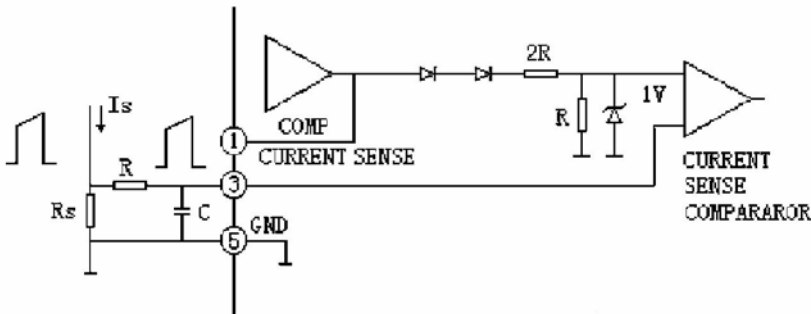
误差放大器开环增益和相位与频率的关系



该放大器的开环增益可达 80dB，开环条件下，频率特性如图所示

内部有 2.5V 基准电压，加在放大器的正端，取样电压经 R_1 、 R_2 分压加在放大器的负端输入，负反馈电阻 R_f 可以调节闭环增益的大小。

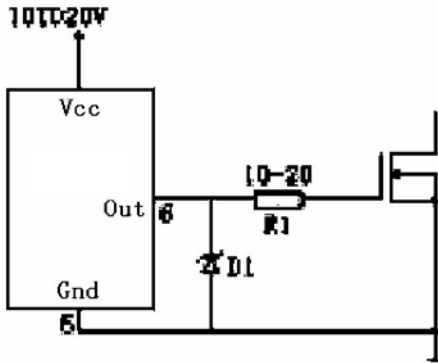
3. 电流传感比较器



取样电压经误差放大器放大后，送至电流传感比较器转换成电流方式控制脉宽。另外，电流传感比较器起着过电流保护作用，最大输出电流 $I_{max} = (N * 1V) / R_s$ ， N 为变压器初级匝数之比。

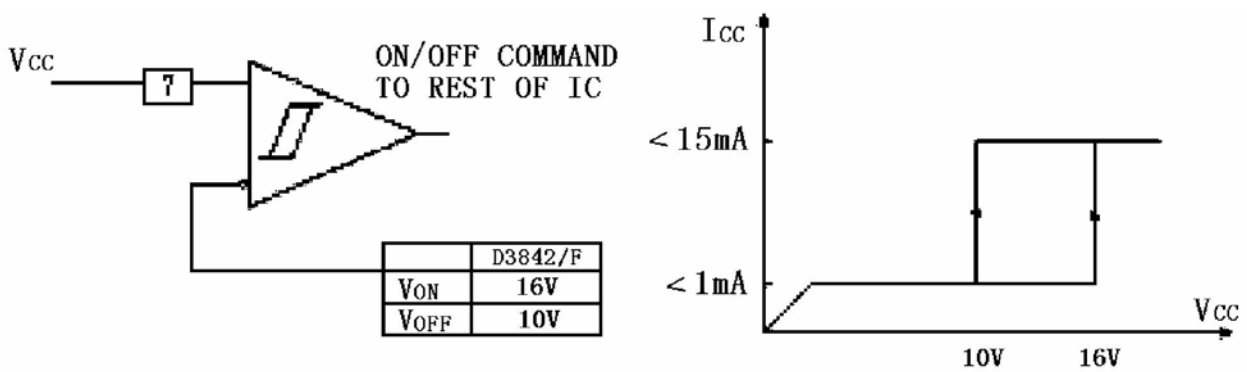


4. 推挽输出



UC3842脉冲方波能直接驱动场效应管，它具有峰值±1A 的驱动电流。

5. 欠电压锁定电路



UC3842内有欠电压锁定电路（UVL），启动电压大于 16V，关断电压小于 10V，这样能使开关电源工作稳定，不受电网波动的影响，另外内部采用 5V 能隙基准电源，非常精确和稳定。



图 1 定时电阻与振荡器频率关系曲线

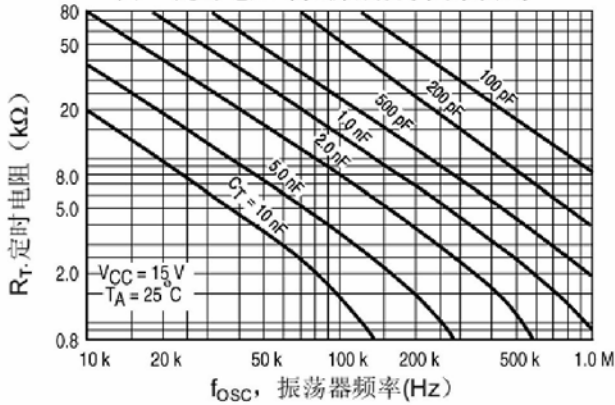


图 2. 输出静区时间与振荡器频率关系曲线

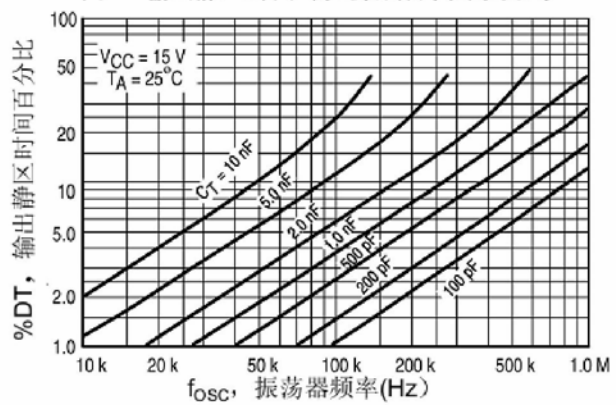


图 3 振荡器放电电流与温度关系曲线

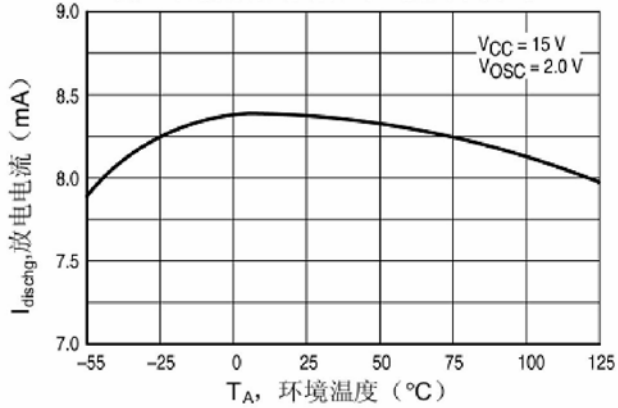


图 4. 最大输出占空比与定时电阻关系曲线

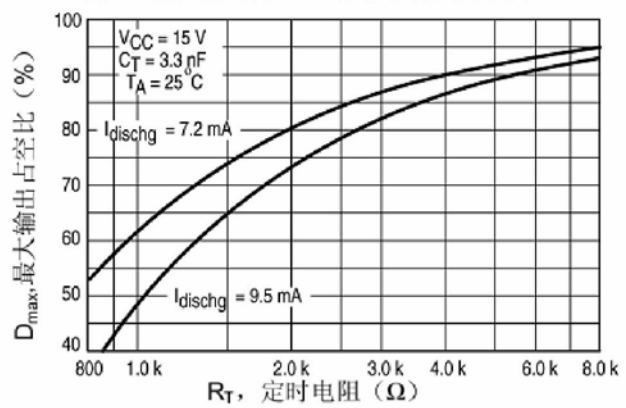


图 5 误差放大器小信号瞬态响应

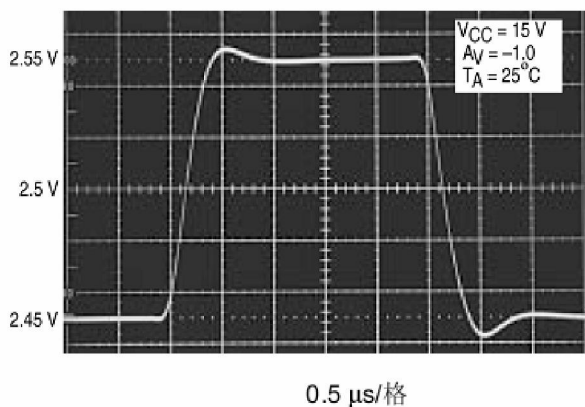


图 6. 误差放大器大信号瞬态响应

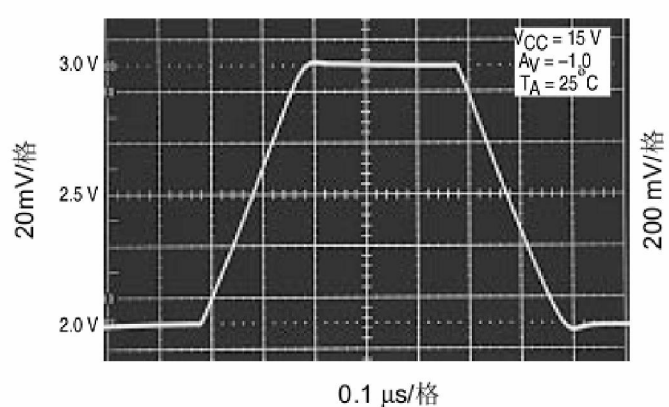




图 7. 误差放大器开环增益及相位与频率关系曲线

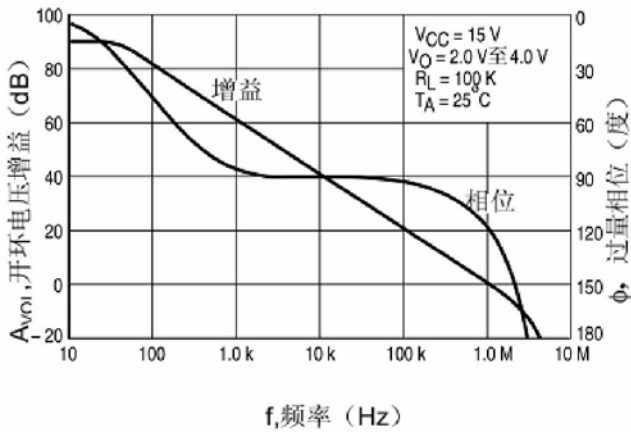


图 8. 电流取样端输入门限与误差放大器输出电压关系曲线

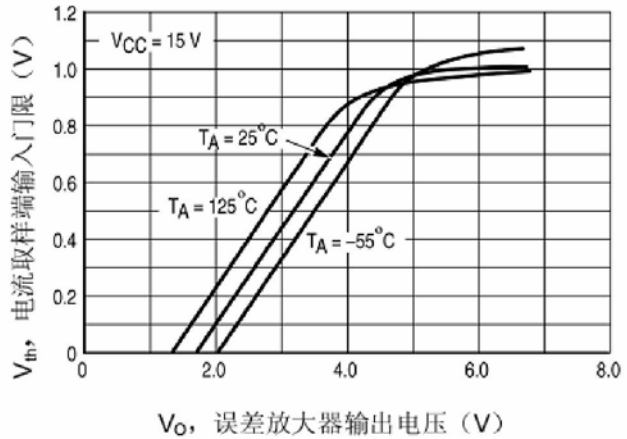


图 9. 参考电压变化与拉电流关系曲线

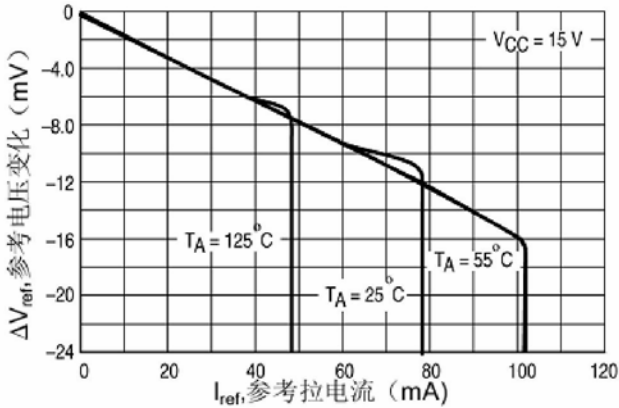


图 10. 参考短路电流与温度关系曲线

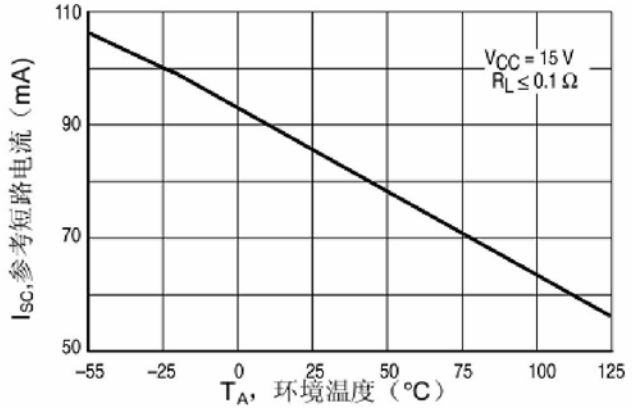


图 11. 参考负载调整率

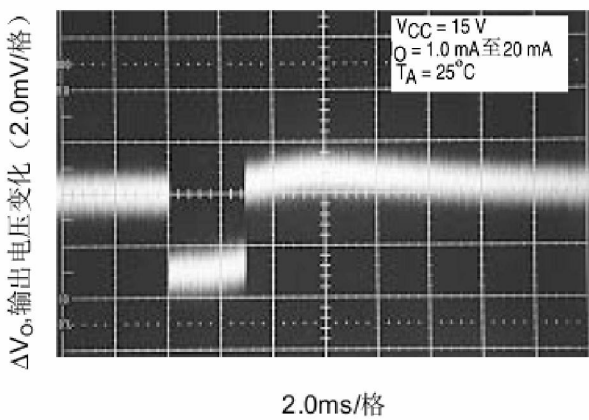


图 12. 参考电源调整率

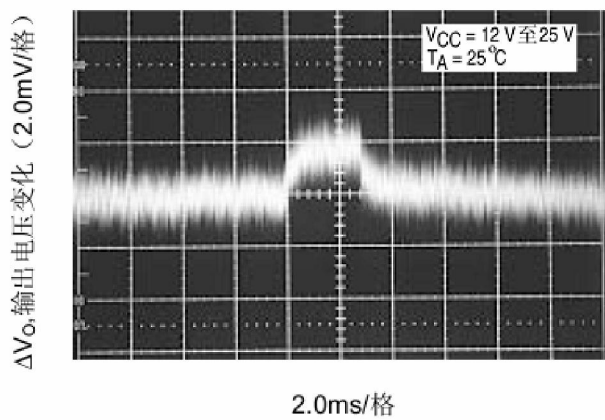




图 13. 输出饱和电压与负载电流关系曲线

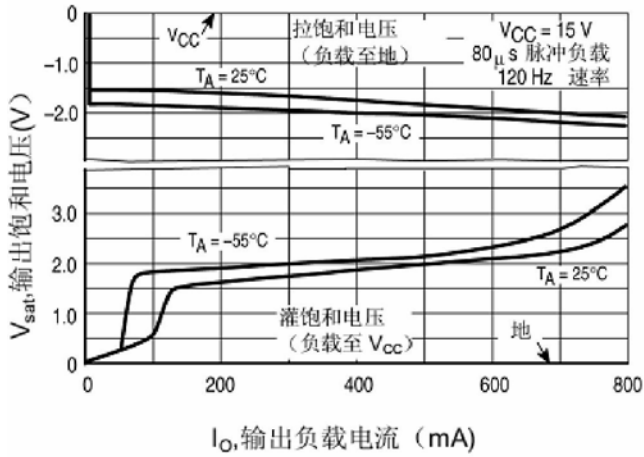


图 14. 输出波形

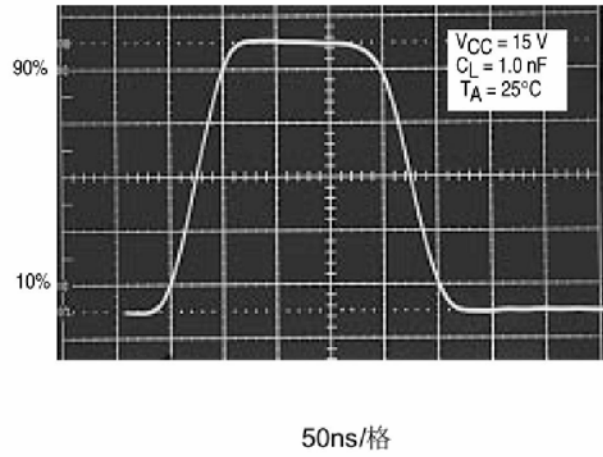


图 15. 输出交叉导通

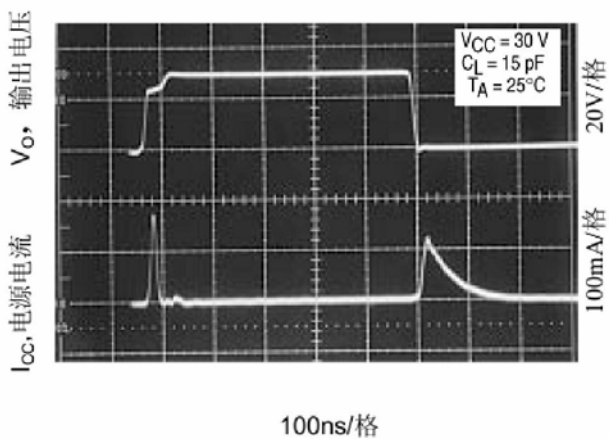


图 16. 电源电流与电源电压关系曲线

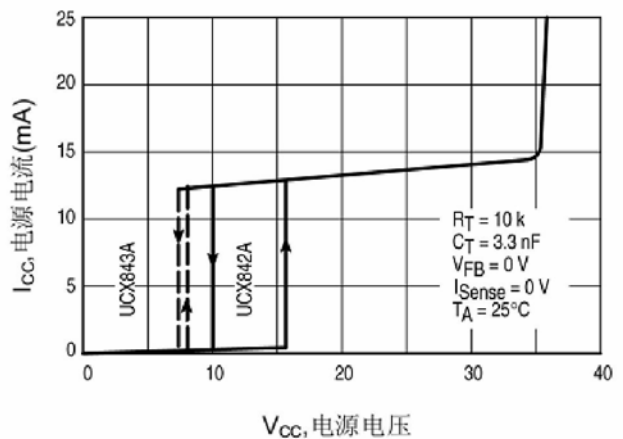




图 17.代表性方框图

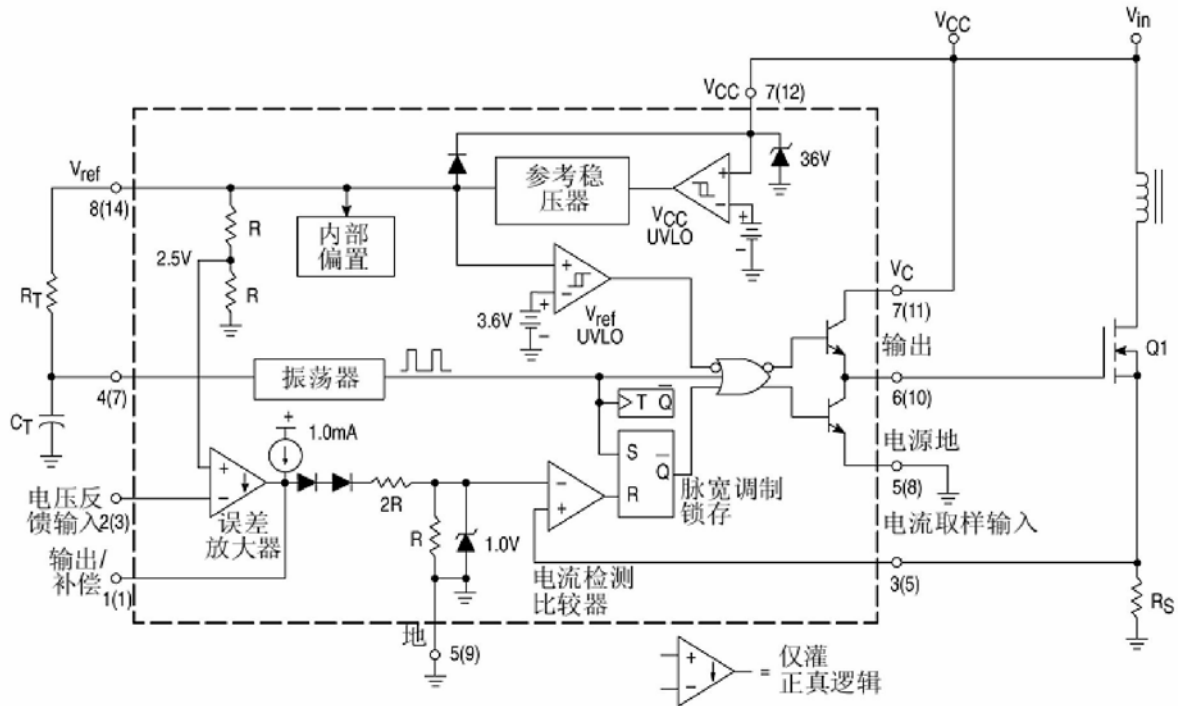
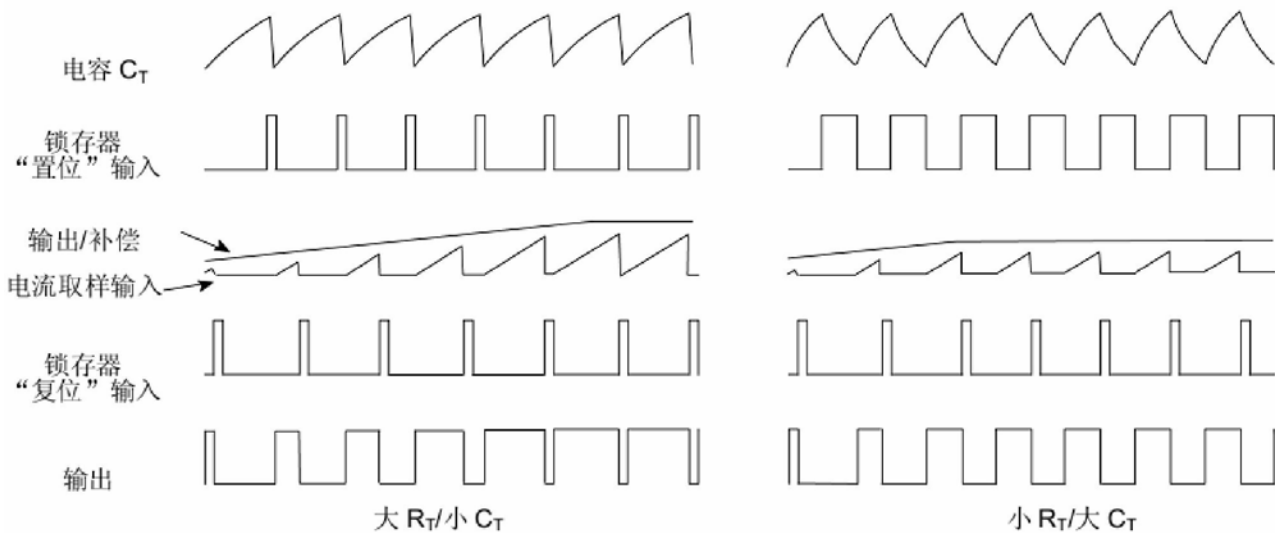


图 18. 时序图





Attention

- Any and all HUA XUAN YANG ELECTRONICS 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 HUA XUAN YANG ELECTRONICS representative nearest you before using any HUA XUAN YANG ELECTRONICS products described or contained herein in such applications.
- HUA XUAN YANG ELECTRONICS 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 specifications of any and all HUA XUAN YANG ELECTRONICS products described or contained herein.
- Specifications of any and all HUA XUAN YANG ELECTRONICS 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's products or equipment.
- HUA XUAN YANG ELECTRONICS CO.,LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that 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 and error prevention circuits for safe design, redundant design, and structural design.
- In the event that any or all HUA XUAN YANG ELECTRONICS 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 the authorities 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 HUA XUAN YANG ELECTRONICS CO.,LTD.
- Information (including circuit diagrams and circuit parameters) herein is for example only ; it is not guaranteed for volume production. HUA XUAN YANG ELECTRONICS believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.
- Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the HUA XUAN YANG ELECTRONICS product that you intend to use.