

AN5905, AN5905S

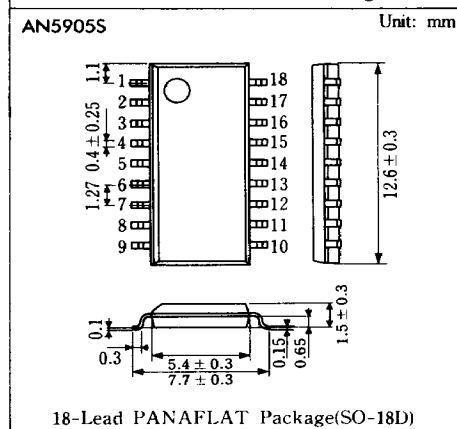
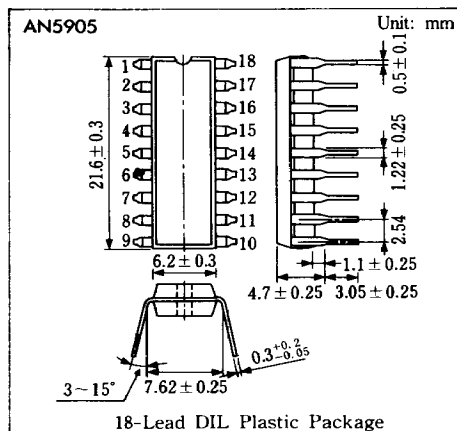
Switching Regulator Control Circuits

■ Outline

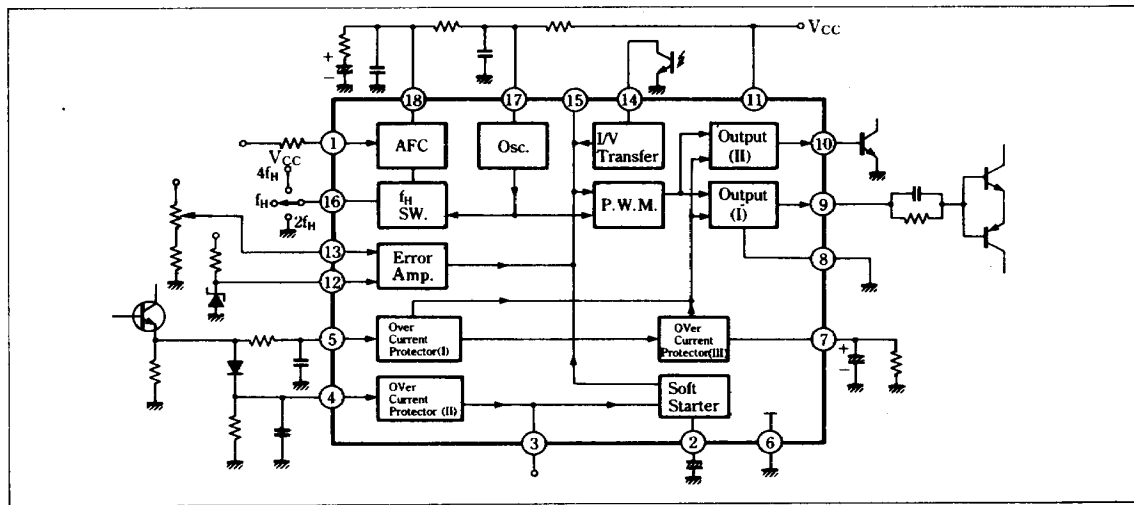
The AN5905 and the AN5905S are integrated circuits which allow the compactness of power system by integrating functions necessary for control of switching power supply.

■ Features

- Oscillation frequency variable (2 times or 4 times)
- Over-current protection circuit built-in
- Soft start circuit built-in



■ Block Diagram



■ Pin

Pin No.	Pin Name	Pin No.	Pin Name
1	Trigger Input	10	Output (II)
2	Soft Start CR	11	V _{CC}
3	Remote Control Input	12	Error Amp. Reference Voltage Input
4	Over Current Protector (II) Input	13	Error Amp. Input
5	Over Current Protector (I) Input	14	Photocoupler Input
6	GND	15	Max. Duty Adj.
7	Over Current Protector (III) CR	16	Freq. SW. Input
8	Output GND	17	Osc. CR
9	Output (I)	18	PLL Det. Output

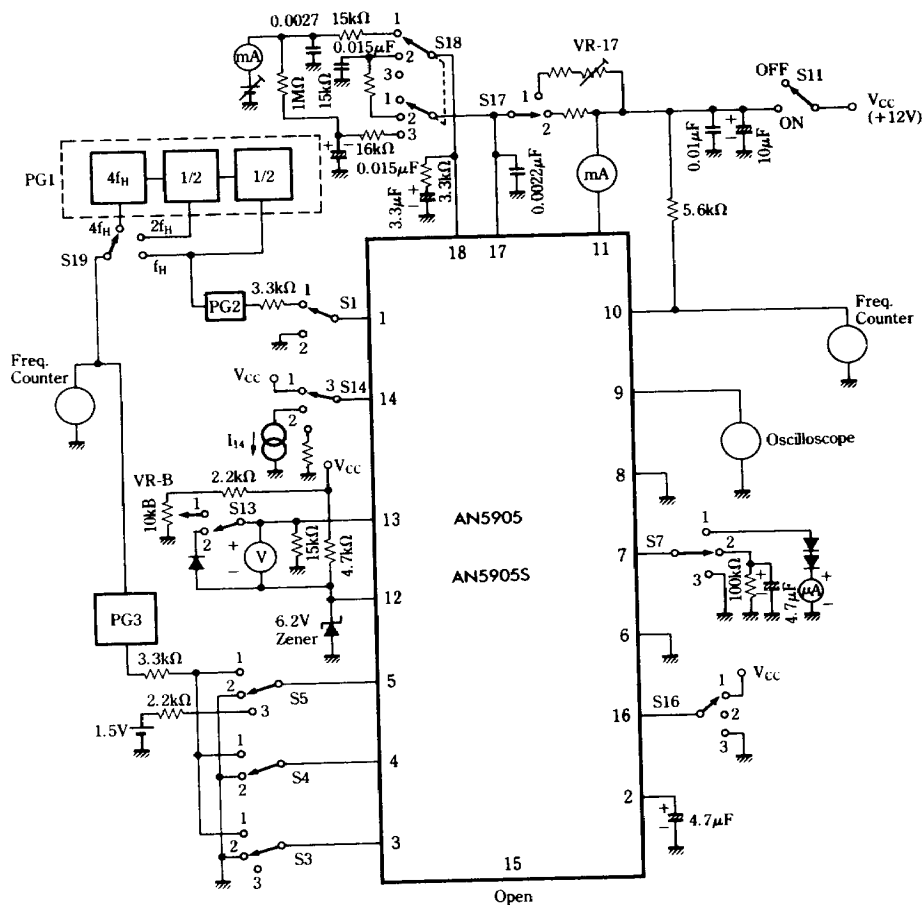
■ Absolute Maximum Ratings (Ta=25°C)

Item	Symbol	Rating	Unit
Supply Voltage	V _{CC}	14.4	V
Power Dissipation	P _D	230	mW
Operating Ambient Temperature	T _{opr}	-20 ~ +70	°C
Storage Temperature	T _{stg}	-55 ~ +125	°C

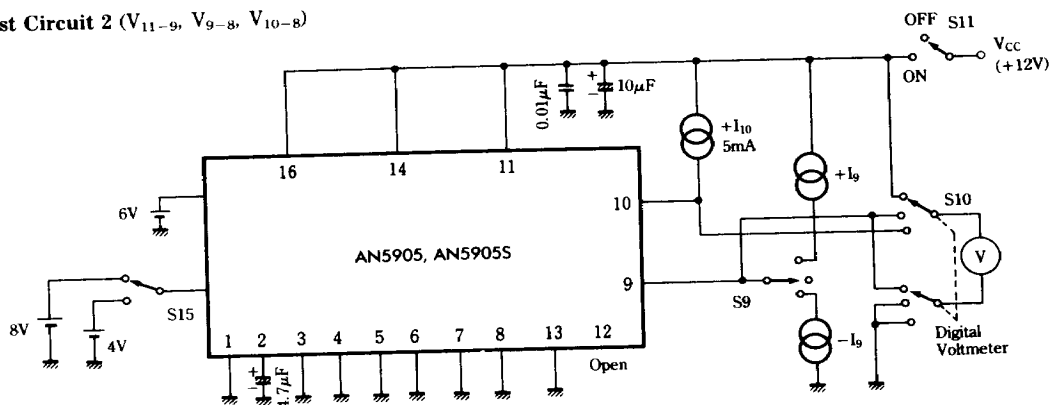
■ Electrical Characteristics (V_{CC}=12V, Ta=25°C)

Item	Symbol	Test Circuit	Condition	min.	typ.	max.	Unit
Total Circuit Current	I _{tot}	1	V _{CC} =12.0V	10	15	18.5	mA
Oscillation Frequency	4f _{osc}	1	V _{CC} =12.0V	56	63	68	kHz
Output Pulse Duty (max.)	tw _(duty)	1	V _{CC} =12.0V	73	81	91	%
Output Pulse Duty (min.)	tw _(duty)	1	V _{CC} =12.0V		0	0	%
Output Saturation Voltage (1)	V _{I1-9}	2	I ₉ = -50mA	1.1	1.5	1.8	V
Output Saturation Voltage (2)	V _{I1-9}	2	I ₉ = -150mA	1.3	1.7	2.0	V
Output Saturation Voltage (3)	V ₉₋₈	2	I ₉ = 50mA		0.35	0.50	V
Output Saturation Voltage (4)	V ₉₋₈	2	I ₉ = 150mA		1.7	2.1	V
Output Saturation Voltage (5)	V _{I10-8}	2	I _{I10} = 5mA		0.40	0.70	V
Over-Current Protection (1)	V _{ocp(1)}	1	V _{CC} =12.0V	0.51	0.63	0.75	V
Over-Current Protection (2)	V _{ocp(2)}	1	V _{CC} =12.0V	0.51	0.63	0.75	V
Over-Current Protection (3)	I _{ocp(3)}	1	V _{CC} =12.0V	40	70	95	μA
Low Supply Voltage Protection	V _{LVP}	1	V _{CC} voltage value when the output is not generated at Pin 9 by gradually decreasing voltage from V _{CC} =12V	4.2	4.7	5.2	V
External Trigger Operation Starting Voltage	V _{tri}	1	V _{CC} =12.0V		1.4	2.0	V _{OP}
Remote Control Pin Operation Level	V _{RMT}	1	V _{CC} =12.0V	0.55	0.71	0.85	V
Oscillator Control Sensitivity	β _{OSC}	1	Oscillation : 4 fH, Trigger Pulse : 12 μs		120		Hz/μA
Differential Threshold Sensitivity	μ	1	Oscillation : 4 fH, Trigger Pulse : 12 μs		28		μA/μs
Horizontal Pull-in Range	f _{HP}	1	Oscillation : 4 fH, Trigger Pulse : 12 μs		±9.5		kHz
Photo Coupler Control Sensitivity	β _P	1	Output duty change for change of flow-out current from Pin ⑭		0.27		%/μA
Photo Coupler Min. Current	I _{I4}	1	Flow-out current from Pin ⑭ which is needed for turning off the output	-450	-340		μA
Error Lamp Control Sensitivity	β _{ER}	1	Output duty change for ΔV _{I3-12} change		3.7		%/mV

Test Circuit 1 (I_{CC} , $4f_{osc}$, $t_{W(duty)}$, $V_{ocp(1)}$, $V_{ocp(2)}$, $I_{ocp(3)}$, V_{LVP} , V_{tri} , β_{CW} , μ , f_{HP} , β_P , I_{14} , β_{ER})



Test Circuit 2 (V_{11-9} , V_{9-8} , V_{10-8})



Switch Mode Table

Item	Test Circuit	Switch																Measuring Instrument
		Trigger	Remote Control	OCP (I)	OCP (II)	ODP Constant	Output (I)	Output (II)	V _{CC}	Error Input	Photo Coupler		Mode SW	Oscillation	AFC	PG Input		
		S1	S3	S4	S5	S7	S9	S10	S11	S13	S14	S15	S16	S17	S18	S19		
I _{cc}	1	2	2	2	2	3	—	—	ON	2	1	—	1	2	2	4f _H	Ammeter	
4f _{osc}	1	2	2	2	2	3	—	—	ON	2	1	—	1	2	2	4f _H	Frequency Counter	
t _{w(des)MAX.}	1	1	2	2	2	3	—	—	ON	2	1	—	1	2	2	4f _H	Oscilloscope	
t _{w(des)MIN.}	1	1	2	2	2	3	—	—	ON	2	3	—	1	2	2	4f _H	Oscilloscope	
V _{I1-9}	2	—	—	—	—	—	3	1	ON	—	—	2	—	—	—	—	Pin ⑨ flow-out 50mA	Digital Voltmeter
V _{I1-9}	2	—	—	—	—	—	3	1	ON	—	—	2	—	—	—	—	Pin ⑨ flow-out 150mA	"
V ₉₋₈	2	—	—	—	—	—	1	2	ON	—	—	1	—	—	—	—	Pin ⑨ flow-in 50mA	"
V ₉₋₈	2	—	—	—	—	—	1	2	ON	—	—	1	—	—	—	—	Pin ⑨ flow-in 150mA	"
V _{I0-8}	2	—	—	—	—	—	2	3	ON	—	—	2	—	—	—	—	Pin ⑨ flow-in 5mA	"
V _{ocp(1)}	1	1	2	2	1	3	—	—	ON	2	1	—	1	2	2	4f _H	Pin⑨ Oscilloscope	
V _{ocp(2)}	1	1	3	1	2	3	—	—	ON	2	1	—	1	2	2	4f _H	"	
I _{ocp(3)}	1	1	2	2	3	1	—	—	ON	2	1	—	1	2	2	4f _H	Ammeter	
V _{LVP}	1	1	2	2	2	3	—	—	ON	2	1	—	1	2	2	4f _H	Pin ⑨ Supply Voltage	
V _{Tri}	1	1	2	2	2	3	—	—	ON	2	1	—	1	2	2	4f _H	Pin① Oscilloscope	
V _{RMT}	1	1	1	2	2	3	—	—	ON	2	1	—	1	2	2	4f _H	Pin ③ Oscilloscope	
β _{OSCosc}	1	2	2	2	2	3	—	—	ON	2	1	—	1	2	3	4f _H	Frequency Counter	
μ	1	1	2	2	2	3	—	—	ON	2	1	—	1	2	1	4f _H	Ammeter	
f _{HP}	1	1	2	2	2	3	—	—	ON	2	1	—	1	1	2	4f _H	Frequency Counter	
β _p	1	1	2	2	2	3	—	—	ON	2	2	—	1	2	2	4f _H	Oscilloscope	
I _{I4}	1	1	2	2	2	3	—	—	ON	2	2	—	1	2	2	4f _H	Ammeter	
β _{ER}	1	1	2	2	2	3	—	—	ON	1	1	—	1	2	2	4f _H	Oscilloscope	