

# M51998P/FP

## Switching Regulator Control

### Description

M51998 is a primary side switching regulator control IC suitable for converting AC power supply to stabilized DC voltage. Basic functions provided are from M51995A and limited to the indispensable. This device is housed in 10pin SOP, 14pin DIP.

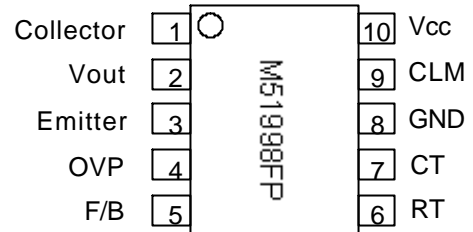
### Features

- Output current(Io peak)-----±1A
- Totempole output
- Small start-up current -----100µA(typ.)
- Start-up threshold 16V .Stop voltage 10V
- Output duty-----51%(internally fixed)
- Pulse-by-pulse current limit
- 10 pin SOP,14 pin DIP package

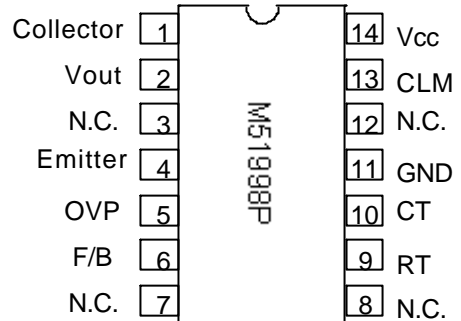
### Application

Flyback regulator

### PIN CONFIGURATION(TOP VIEW)

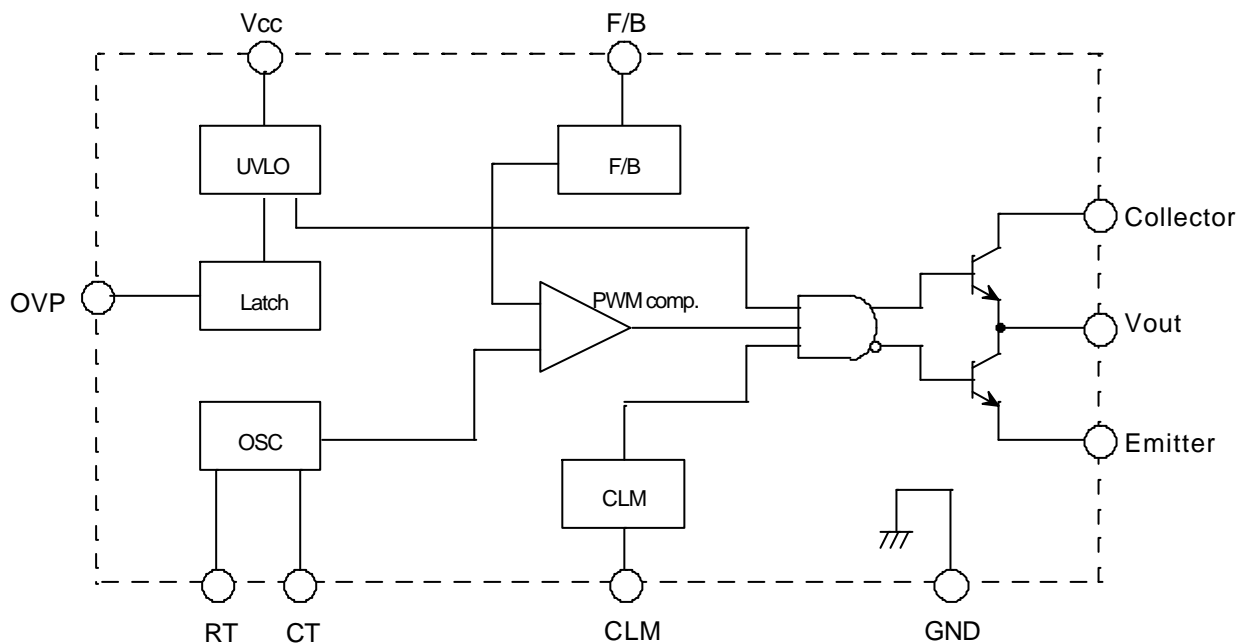


### Outline 10P2N-A



### Outline 14P4

### BLOCK DIAGRAM



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ABSOLUTE MAXIMUM RATINGS(Ta=25°C,unless otherwise noted.)

Symbol	Parameter	Condition	Ratings	Unit
V <sub>cc</sub>	Supply voltage		36	V
V <sub>c</sub>	Collector terminal voltage		36	V
I <sub>o</sub>	Output current	Peak	±1	A
		Continuous	±0.15	A
V <sub>CLM</sub>	CLM terminal voltage		-0.3~+4.0	V
I <sub>OVP</sub>	OVP terminal voltage		10	mA
V <sub>FB</sub>	F/B terminal voltage		0~10	V
P <sub>d</sub>	Power dissipation		440	mW
K <sub>θ</sub>	Thermal derating ratio		3.52	mW/°C
T <sub>opr</sub>	Operating temperature		-20~85	°C
T <sub>stg</sub>	Storage temperature		-40~125	°C

ELECTRICAL CHARACTERISTICS(Ta=25°C, V<sub>cc</sub>=5V, unless otherwise noted.)

BLOCK	Symbol	Parameter	Test conditions	Limits			Unit
				Min.	Typ.	Max.	
	V <sub>cc</sub>	Operating voltage range		V <sub>cc</sub> (STOP)		35	V
	V <sub>cc</sub> (START)	Operation start voltage		15.2	16.2	17.2	V
	V <sub>cc</sub> (STOP)	Operation stop voltage		9.0	9.9	10.9	V
	ΔV <sub>cc</sub>	Start/stop differential	DV <sub>cc</sub> =V <sub>cc</sub> (START)-V <sub>cc</sub> (STOP)	5.0	6.3	7.6	V
	I <sub>ccL</sub>	Start-up current	V <sub>cc</sub> =14.5V, Ta=25°C	50	100	150	μA
			V <sub>cc</sub> =14.5V, -20<Ta<85°C	40	100	200	μA
	I <sub>CCO</sub>	Circuit current	V <sub>cc</sub> =30V	8	12	21	mA
	I <sub>cc OVP</sub>	Circuit current in OVP state	V <sub>cc</sub> =25V	1.3	2.0	3.0	mA
V <sub>cc</sub> =9.5V			125	210	320	μA	
F / B	I <sub>FBMIND</sub>	Current at 0% duty		-2.10	-1.54	-1.00	mA
	I <sub>FBMAXD</sub>	Current at maximum duty		-0.90	-0.55	-0.40	mA
	ΔI <sub>FB</sub>	Max./0% differential	DIFB=I <sub>FBMIND</sub> -I <sub>FBMAXD</sub>	-1.35	-0.99	-0.70	mA
	V <sub>FB</sub>	F/B terminal voltage		4.9	5.9	7.1	V
	R <sub>FB</sub>	F/B terminal resistance		420	600	780	Ω
OVP	V <sub>THOVPH</sub>	OVP term. H threshold volt.		540	750	960	mV
	ΔV <sub>THOVP</sub>	OVP term. hysteresis volt.	ΔV <sub>THOVP</sub> =V <sub>THOVPH</sub> -V <sub>THOVPL</sub>	-	30	-	mV
	I <sub>THOVP</sub>	OVP term. threshold current		80	150	250	μA
	I <sub>INOVP</sub>	OVP term. input current		80	150	250	μA

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BLOCK	Symbol	Parameter	Test conditions	Limits			Unit
				Min.	Typ.	Max.	
P V O	V <sub>cc</sub> OVPC	OVP reset supply voltage		7.5	9.0	10.0	V
	V <sub>cc</sub> (STOP) -V <sub>cc</sub> OVPC	Operation stop volt. -OVP reset supply voltage		0.55	1.20	-	V
	I <sub>TH</sub> OVPC	Current from OVP terminal for OVP reset	V <sub>cc</sub> =30V V <sub>cc</sub> =18V	-480 -210	-320 -140	-213 -93	μA
C L M	V <sub>TH</sub> CLM	CLM terminal threshold volt.		180	200	220	mV
	I <sub>IN</sub> CLM	CLM terminal current		-280	-200	-140	μA
	T <sub>PD</sub> CLM	Delay time from CLM to V <sub>out</sub>		-	90	-	ns
	f <sub>osc</sub>	Oscillation frequency	RT=27kΩ, CT=470pF	68	75	82	kHz
	T <sub>DUTY</sub>	Maximum ON duty		48	51	54	
	V <sub>OSCH</sub>	Upper limit volt.of OSC waveform		3.97	4.37	4.77	V
	V <sub>oscL</sub>	Lower limit volt.of OSC waveform		1.76	1.96	2.16	V
	ΔV <sub>osc</sub>	Upper/lower limit volt.diffrence		2.11	2.41	2.71	V
	V <sub>RT</sub>	RT terminal voltage	RT=27kΩ	3.80	4.50	5.40	V
	V <sub>OL1</sub>	Output low voltage	V <sub>cc</sub> =18V, I <sub>o</sub> =10mA	-	0.04	0.4	V
	V <sub>OL2</sub>		V <sub>cc</sub> =18V, I <sub>o</sub> =100mA	-	0.7	1.4	V
	V <sub>OL3</sub>		V <sub>cc</sub> =5V, I <sub>o</sub> =1mA	-	0.85	1.0	V
	V <sub>OL4</sub>		V <sub>cc</sub> =5V, I <sub>o</sub> =100mA	-	1.3	2.0	V
	V <sub>OH1</sub>	Output high voltage	V <sub>cc</sub> =18V, I <sub>o</sub> =-10mA	16.0	16.7	-	V
	V <sub>OH2</sub>		V <sub>cc</sub> =18V, I <sub>o</sub> =-100mA	15.5	16.5	-	V
	T <sub>RISE</sub>	Output voltage rise time		-	50	-	ns
	T <sub>FALL</sub>	Output voltage fall time		-	35	-	ns

