

# M51593FP

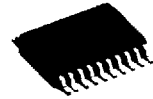
## PREAMPLIFIER FOR OPTICAL PICKUP

### DESCRIPTION

The M51593FP is a semiconductor integrated circuit developed as an optical pickup preamplifier for CD players. In a microminiature 20-pin flat package, it contains four I-V amplifiers that convert current signals gained by optical pickup photodetectors into voltage signals and also has FE (focus error), TE (tracking error), and RF amplifier, as well as an APC. The IC can be mounted on an optical pickup main assembly.

### FEATURES

- Supports 3-laser system.
- Capable of being driven by either single or dual power supply.
- Built-in LPF for TE and FE amplifiers. (to remove unwanted high-frequency components)
- Focus error balance control pin (pin ⑨)
- Built-in housed in microminiature 20-pin flat package. (0.65mm lead pitch)
- Built-in auto power controller (APC)



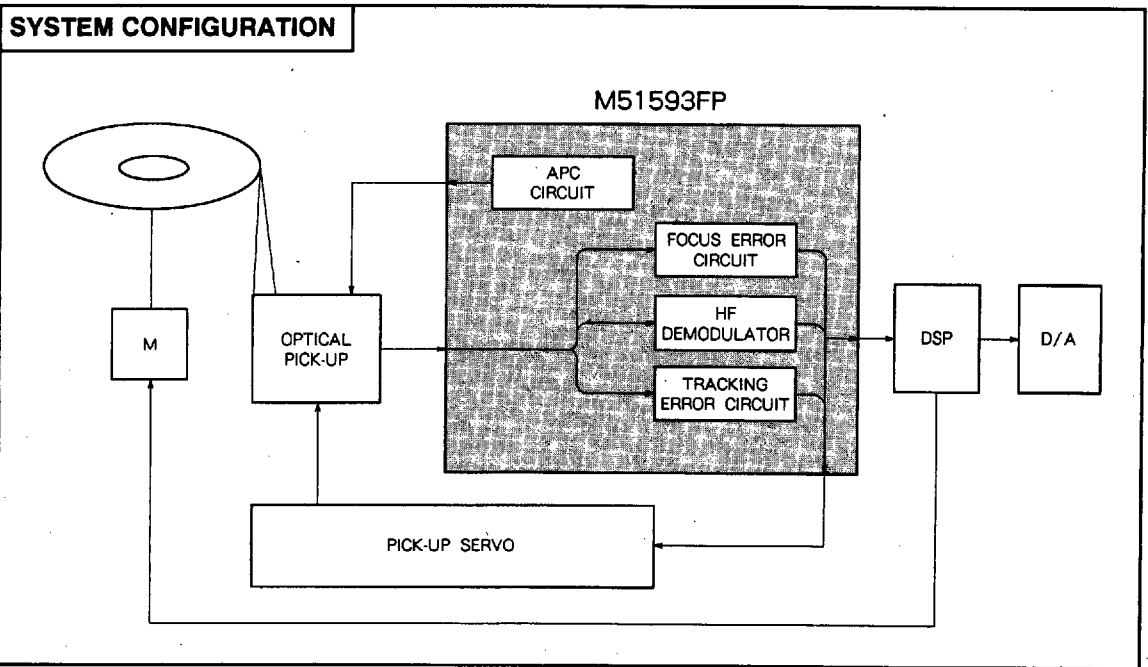
Outline 20P2E-A  
0.65mm pitch 225mil SSOP  
(4.4mm × 6.5mm × 1.15mm)

### RECOMMENDED OPERATING CONDITIONS

Supply voltage range.....  $V_{CC}, V_{EE} = \pm 5V$   
 (2 split supply voltage)  
 or  $V_{CC} = +5V$  (single supply voltage)

Rated supply voltage.....  $V_{CC}, V_{EE} = \pm 4.75$  to  $\pm 5.25V$   
 or  $V_{CC} = 4.75$  to  $5.25V$

Rated power dissipation ..... 60mW

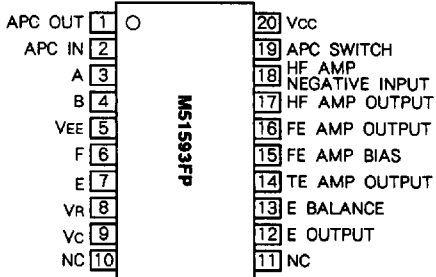


6249826 0021743 188

# M51593FP

## PREAMPLIFIER FOR OPTICAL PICKUP

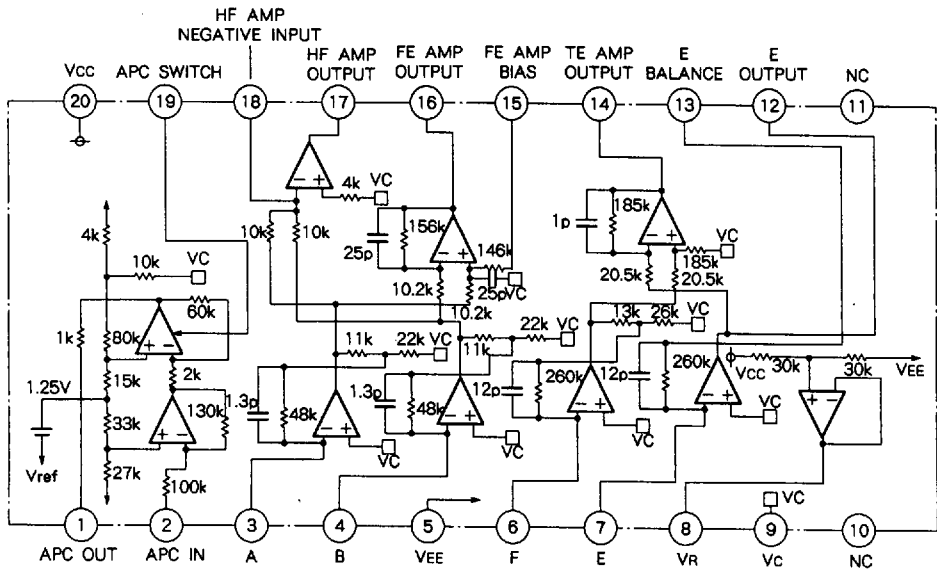
### PIN CONFIGURATION (TOP VIEW)



Outline 20P2E-A

NC: NO CONNECTION

### IC INTERNAL BLOCK DIAGRAM



Units Resistance :  $\Omega$   
Capacitance : F

PREAMPLIFIER FOR OPTICAL PICKUP

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

Symbol	Parameter	Ratings	Unit
V <sub>CC</sub>	Supply voltage	+ 6.5	V
V <sub>EE</sub>		- 6.5	V
I <sub>CC</sub>	Circuit current	40	mA
V <sub>I</sub>	Input voltage	V <sub>CC</sub> - 0.3	V
V <sub>O</sub>	Output voltage	V <sub>CC</sub> - 0.3	V
P <sub>d</sub>	Power dissipation	360	mW/°C
T <sub>opr</sub>	Operating temperature	- 20 to + 75	°C
T <sub>stg</sub>	Storage temperature	- 40 to + 125	°C

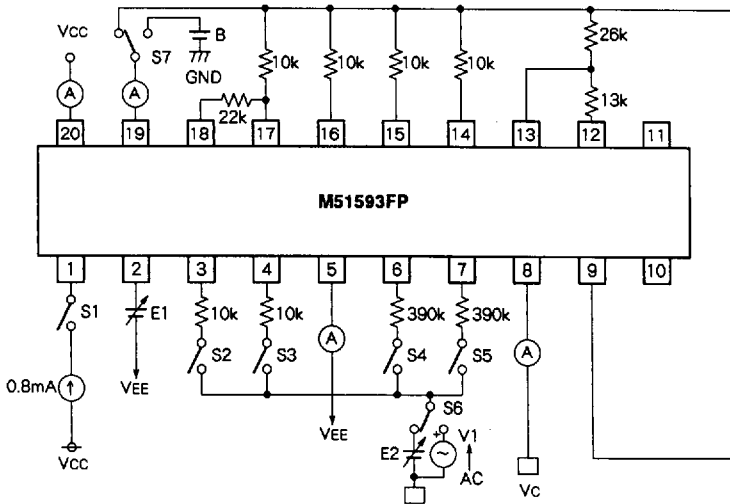
**ELECTRICAL CHARACTERISTICS** (Ta = 25°C, V<sub>CC</sub> = 5V, V<sub>EE</sub> = - 5V)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I <sub>CC</sub>	Circuit current	V <sub>CC</sub> = 5V, V <sub>EE</sub> = - 5V	-	12	20	mA
I <sub>EE</sub>		V <sub>C</sub> = 0V	- 20	- 12	-	mA
V <sub>H</sub> F-1	Output voltage	No signal	- 80	0	+ 80	mV
V <sub>H</sub> F-2	Voltage gain	V <sub>i</sub> = 2kHz, 40mV <sub>P-P</sub>	28.2	31.2	34.2	dB
f <sub>CH</sub> F	Frequency characteristics	3dB down	1.5	2.3	-	MHz
V <sub>H</sub> F-3	Maximum output amplitude high		3.5	4.5	-	V
V <sub>H</sub> F-4	Maximum output amplitude low		-	- 2.2	- 0.3	V
V <sub>F</sub> E-1	Output voltage	V <sub>i</sub> = 1kHz, 32mV <sub>P-P</sub>	- 120	0	+ 120	mV
V <sub>F</sub> E-2	Voltage gain 1		39.1	42.1	45.1	dB
V <sub>F</sub> E-3	Voltage gain 2		39.1	42.1	45.1	dB
V <sub>F</sub> E-4	Voltage gain balance	V <sub>4</sub> = V <sub>2</sub> - V <sub>3</sub>	- 3	0	3	dB
f <sub>CF</sub> E	Frequency characteristics	3dB down	28	40	52	kHz
V <sub>F</sub> E-5	Maximum output amplitude high		4.2	4.5	-	V
V <sub>F</sub> E-6	Maximum output amplitude low		-	- 4.5	- 2.2	V
V <sub>T</sub> E-1	Output voltage	V <sub>i</sub> = 1kHz, 300mV <sub>P-P</sub>	- 120	0	+ 120	mV
V <sub>T</sub> E-2	Voltage gain 1		16.4	19.4	22.4	dB
V <sub>T</sub> E-3	Voltage gain 2		16.4	19.4	22.4	dB
V <sub>T</sub> E-4	Voltage gain balance		V <sub>4</sub> = V <sub>2</sub> - V <sub>3</sub>	- 3	0	3
f <sub>CT</sub> E	Frequency characteristics	3dB down	28	40	52	kHz
V <sub>T</sub> E-5	Maximum output amplitude high		4.2	4.5	-	V
V <sub>T</sub> E-6	Maximum output amplitude low		-	- 4.5	- 2.2	V
V <sub>A</sub> PC1	Output voltage 1	I <sub>i</sub> = 0.8mA	-	- 1.7	- 0.4	V
V <sub>A</sub> PC2	Output voltage 2		- 1.0	0.3	1.6	V
V <sub>A</sub> PC3	Output voltage 3		1.0	2.3	-	V
V <sub>A</sub> PC4	Output voltage 4		4.6	4.8	-	V
V <sub>A</sub> PC5	Output voltage 5		-	- 3.0	2.0	V
V <sub>R</sub> -1	Output voltage 1		- 100	0	100	mV

# M51593FP

## PREAMPLIFIER FOR OPTICAL PICKUP

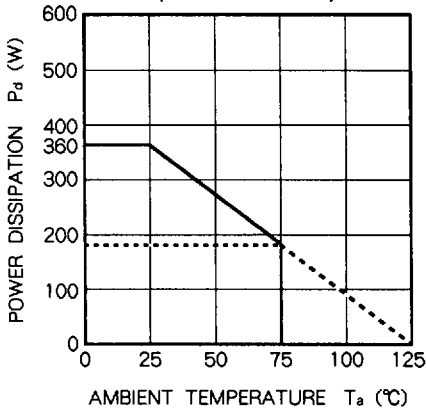
### TEST CIRCUIT



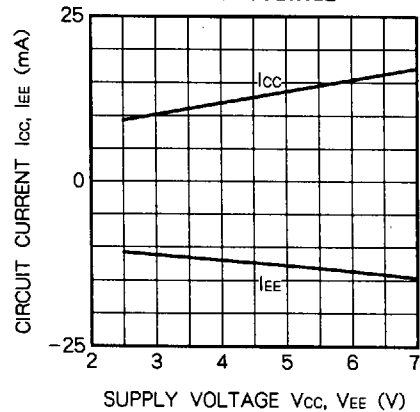
Unit Resistance : Ω

### TYPICAL CHARACTERISTICS

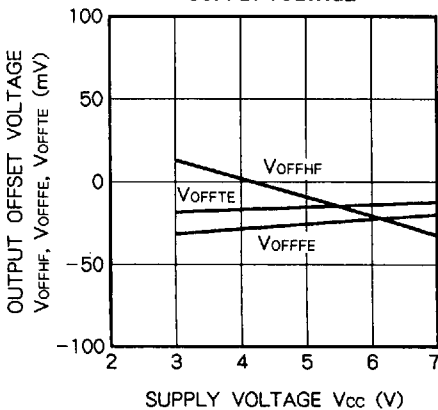
**THERMAL DERATING  
(MAXIMUM RATING)**



**CIRCUIT CURRENT VS.  
SUPPLY VOLTAGE**



**OUTPUT OFFSET VOLTAGE VS.  
SUPPLY VOLTAGE**



**VOLTAGE GAIN VS.  
SUPPLY VOLTAGE**

