

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# TA2066F

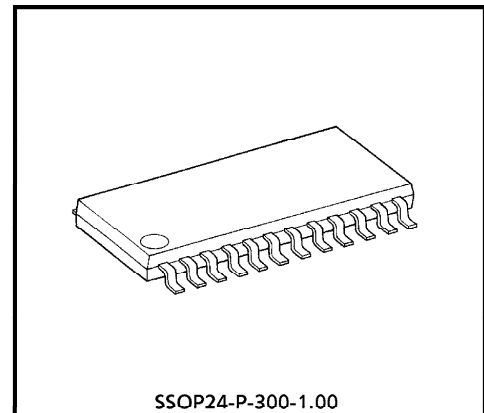
## RF AMPLIFIER FOR DIGITAL SERVO CD SYSTEM

TA2066F is a 3-beam type PUH compatible RF Amplifier to be used in the CD system.

In combination with a CMOS single chip processor TC9295F/TC9296F/TC9405F/TC9406F, a CD system can be composed very simply.

### FEATURES

- Built in amplifier for reference supply
- Built in Auto Laser Power Control circuit
- Built in RF amplifier
- Built in focus error amp, and tracking error amp
- Built in sub-beam adder signal amplifier
- Capable of tracking balance control with TC9295F/TC9296F/TC9405F/TC9406F
- Low power decimation
- Capable of Double speed operation and quadruple operation



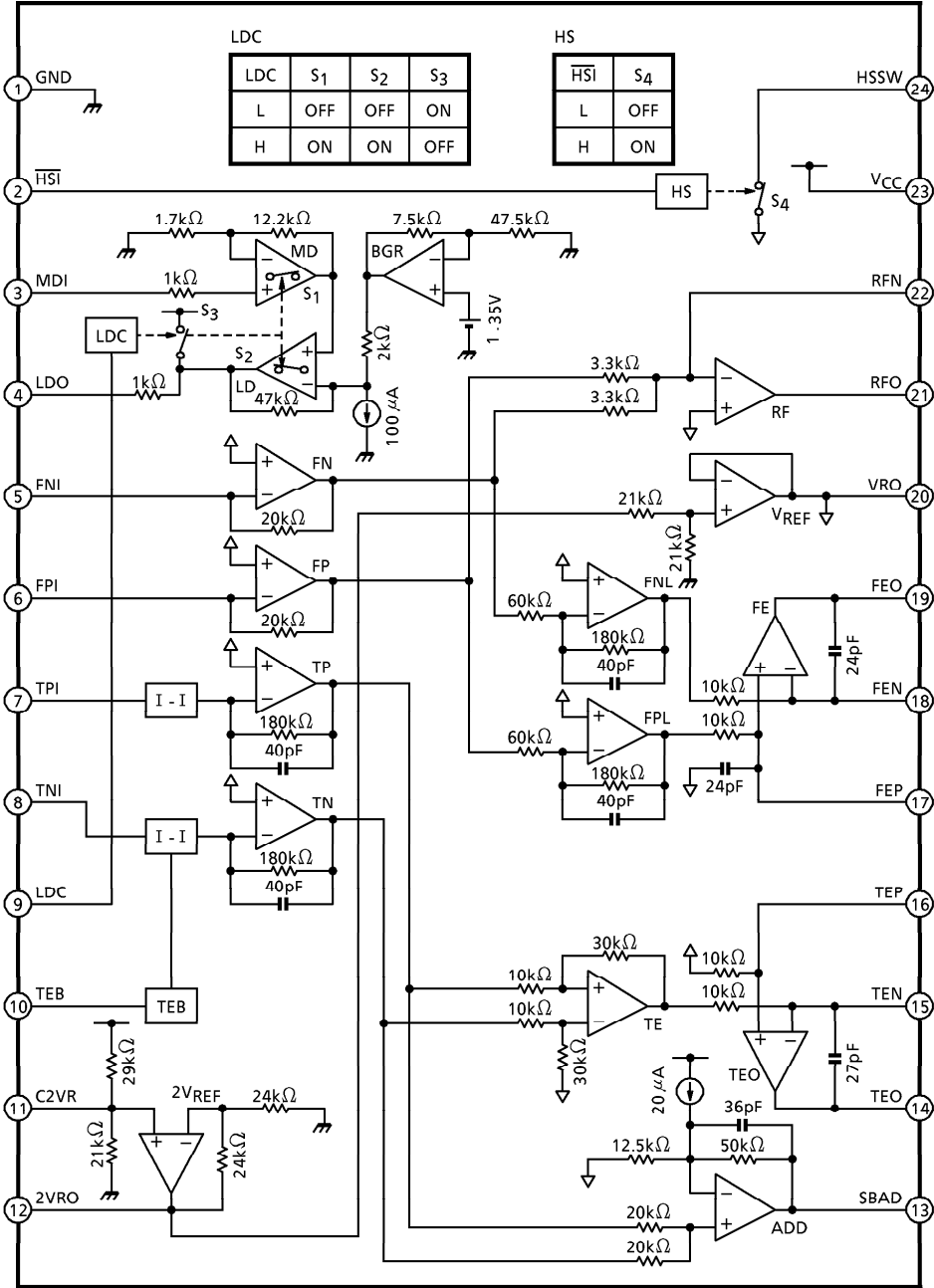
SSOP24-P-300-1.00

Weight : 0.3g (Typ.)

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BLOCK DIAGRAM



## PIN FUNCTION

PIN No.	SYMBOL	I/O	FUNCTIONAL DESCRIPTION	REMARKS
1	GND	—	Ground terminal.	—
2	$\overline{\text{HSI}}$	I	Analog switch control signal input terminal for hi speed control.	—
3	MDI	I	Monitor photo diode amp input terminal.	Connected to monitor photo diode.
4	LDO	O	Laser diode amp input terminal.	Connected to laser diode circuit.
5	FNI	I	Main beam I-V amp input terminal.	Connected to pin diode B + D.
6	FPI	I	Main beam I-V amp input terminal.	Connected to pin diode A + C.
7	TPI	I	Sub beam I-V amp input terminal.	Connected to pin diode F.
8	TNI	I	Sub beam I-V amp input terminal.	Connected to pin diode E.
9	LDC	I	Laser diode control signal input terminal.	—
10	TEB	I	Tracking balance control signal input terminal.	—
11	C2VR	I	Reference supply input terminal.	—
12	2VRO	O	Reference signal output terminal. ( $2V_{\text{REF}} = 4.2\text{V}$ when $V_{\text{CC}} = 5\text{V}$ )	—
13	SBAD	O	Sub beam adder signal output terminal.	—
14	TEO	O	Tracking error signal output terminal.	—
15	TEN	I	TE amp negative input terminal.	Connected TEO through feedback register.
16	TEP	I	TE amp positive input terminal.	Connected VRO.
17	FEP	I	FE amp positive input terminal.	Connected VRO through resistor.
18	FEN	I	FE amp negative input terminal.	Connected FEO through feedback register.
19	FEO	O	Focus error signal output terminal.	—
20	VRO	O	Reference signal output terminal. ( $V_{\text{REF}} = 2.1\text{V}$ when $V_{\text{CC}} = 5\text{V}$ )	—
21	RFO	O	RF signal output terminal.	—
22	RFN	I	RF amp negative input terminal.	Connected RFO through RF amp feedback circuit.
23	VCC	—	Power supply input terminal.	—
24	HSSW	O	Hi speed control signal output terminal.	Connected RF amp feedback circuit.

**MAXIMUM RATINGS** (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Power Supply Voltage	V <sub>CC</sub>	-0.3~12.0	V
Power Dissipation	P <sub>D</sub>	400 (*)	mW
Operating Temperature	T <sub>opr</sub>	-35~85	°C
Storage Temperature	T <sub>stg</sub>	-55~150	°C

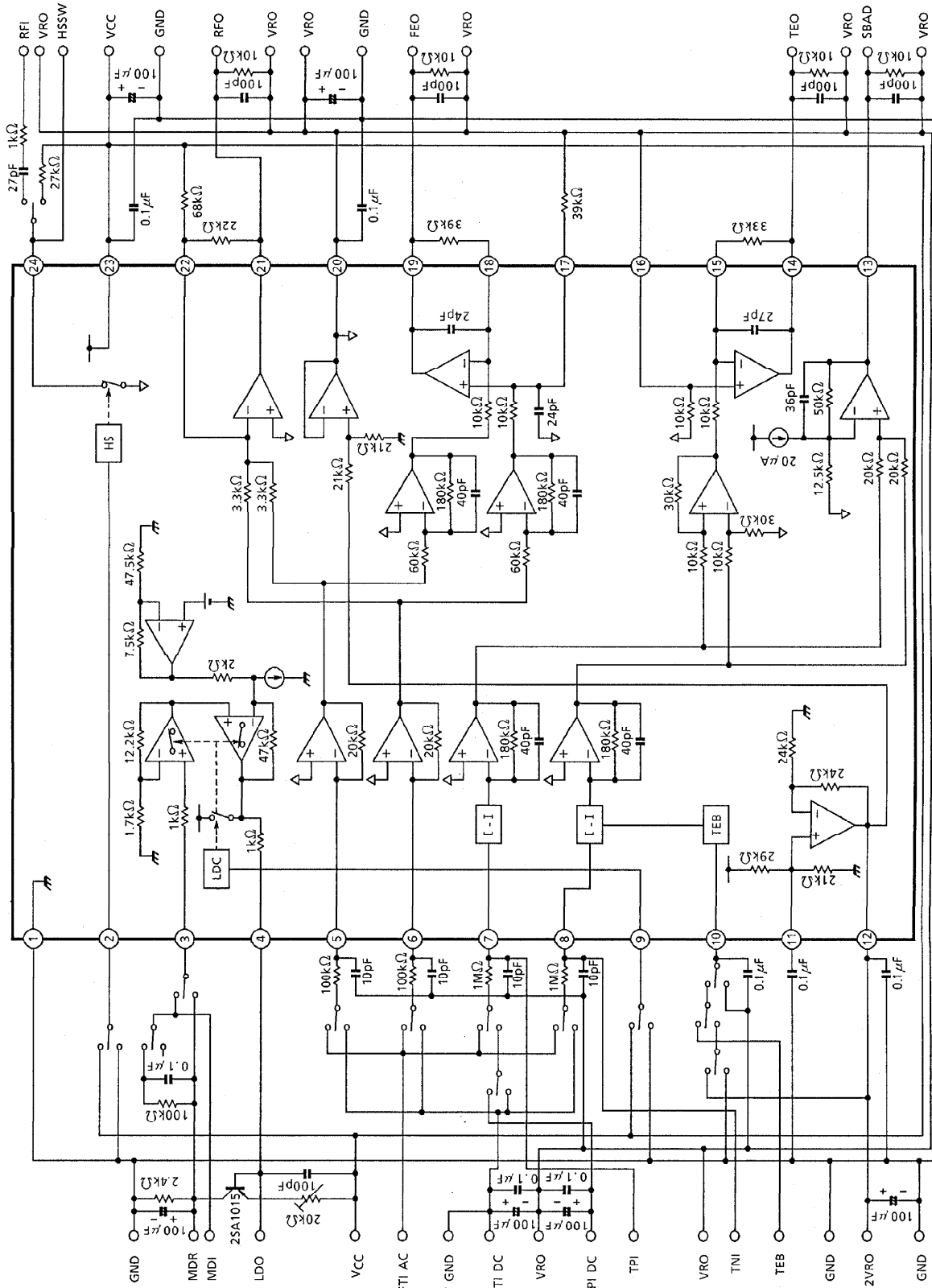
(\*) Derated above 25°C in the proportion 3.2mW/°C.

**AC CHARACTERISTICS** (Unless otherwise specified, V<sub>CC</sub> = 5V, Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply	Assured Supply Voltage	V <sub>CC</sub>	—	—	3.5	5.0	5.5	V
	Power Supply Current	I <sub>CC</sub>	—	SEL = HiZ	—	16.0	22.0	mA
Reference Voltage : 2V <sub>REF</sub>	Reference Voltage	2VR	—	—	4.0	4.2	4.4	V
	Output Current	I <sub>OH</sub>	—	ΔV = -0.1V	5.0	—	—	mA
	Input Current	I <sub>OL</sub>	—	ΔV = 0.1V	0.1	—	—	mA
Reference Voltage : V <sub>REF</sub>	Reference Voltage	VR	—	—	2.0	2.1	2.2	V
	Reference Voltage Limit	ΔVR	—	(2·VR / 2VR) - 1	-3.0	—	3.0	%
	Output Current	I <sub>OH</sub>	—	ΔV = -0.1V	5.0	—	—	mA
	Input Current	I <sub>OL</sub>	—	ΔV = 0.1V	5.0	—	—	mA
APC	Gain Voltage	G <sub>V</sub>	—	f = 1kHz	—	200	—	V/V
	Operation Reference Voltage	V <sub>MDI</sub>	—	V <sub>LDO</sub> = 3.5V <sub>DC</sub>	170	178	192	mV
	LD Off Voltage	V <sub>LDOF</sub>	—	LDC = L, V <sub>CC</sub> Reference	-0.7	—	—	V
	Input Bias Current	I <sub>I</sub>	—	—	-200	—	200	nA
RF	Transfer Resistance	R <sub>T</sub>	—	f = 100kHz	120	133	147	kΩ
	Frequency Characteristic	f <sub>c</sub>	—	-3dB Point	—	3.0	—	MHz
	Output Slew Rate	SR	—	C <sub>RFO</sub> = 20pF	—	20	—	V/μs
	Total Harmonic Distortion	THD	—	f = 100kHz, V <sub>RF</sub> = 1.4V <sub>p-p</sub>	—	-50	—	dB
	Operation Reference Voltage	V <sub>OPR</sub>	—	VR Reference	-1.03	-0.94	-0.84	V
	Upper Limit Output Voltage	V <sub>OH</sub>	—	GND Reference	3.6	—	—	V
	Lower Limit Output Voltage	V <sub>OL</sub>	—	GND Reference	—	—	0.7	V
	Permissive Load Resistance	R <sub>LM</sub>	—	—	10	—	—	kΩ
	HSSW ON Voltage (DC)	V <sub>HSON</sub>	—	VR Reference	—	—	50	mV
	HSSW ON Voltage (AC)	V <sub>HSON</sub>	—	f = 100kHz, V <sub>RFI</sub> = 1.0V <sub>p-p</sub>	—	-50	—	dB

CHARACTERISTIC		SYMBOL	TEST CIRCUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
FE	Transfer Resistance	$R_T$	—	f = 1kHz	211	234	257	k $\Omega$
	Gain Balance	$G_B$	—	f = 1kHz	- 1.0	—	1.0	dB
	Frequency Characteristic	$f_c$	—	- 3dB Point	—	22	—	kHz
	Total Harmonic Distortion	THD	—	f = 1kHz, $V_{FEO} = 2.7V_{p-p}$	—	- 70	—	dB
	Output Offset Voltage	$V_{OS}$	—	VR Reference	- 80	—	80	mV
	Upper Limit Output Voltage	$V_{OH}$	—	GND Reference	3.8	—	—	V
	Lower Limit Output Voltage	$V_{OL}$	—	GND Reference	—	—	0.5	V
	Permissive Load Resistance	$R_{LM}$	—	—	10	—	—	k $\Omega$
TE	Transfer Resistance	$R_T$	—	f = 1kHz	1.60	1.78	1.96	M $\Omega$
	Transfer Resistance Adjusting Range	$\Delta R_T$	—	TEB = 2VR, TEB = VR Reference	- 55	- 45	- 35	%
				TEB = GND, TEB = VR Reference	35	45	55	
	Gain Balance	$G_B$	—	f = 1kHz, TEB = VR	- 1.0	—	1.0	dB
	Frequency Characteristic	$f_c$	—	- 3dB Point	—	22	—	kHz
	Total Harmonic Distortion	THD	—	f = 1kHz, $V_{TEO} = 2.7V_{p-p}$	—	- 50	—	dB
	Input Terminal Voltage	$V_I$	—	VR Reference	—	- 150	—	mV
	Output Offset Voltage	$V_{OS}$	—	VR Reference	- 80	—	80	mV
	Upper Limit Output Voltage	$V_{OH}$	—	GND Reference	3.8	—	—	V
	Lower Limit Output Voltage	$V_{OL}$	—	GND Reference	—	—	0.5	V
Permissive Load Resistance	$R_{LM}$	—	—	10	—	—	k $\Omega$	
SBAD	Transfer Resistance	$R_T$	—	f = 1kHz	324	450	594	k $\Omega$
	Frequency Characteristic	$f_c$	—	—	—	22	—	kHz
	Total Harmonic Distortion	THD	—	f = 1kHz, $V_{SBAD} = 2.0V_{p-p}$	—	- 50	—	dB
	Operation Reference Voltage	$V_{OPR}$	—	VR Reference	- 1.1	- 1.0	- 0.9	V
	Upper Limit Output Voltage	$V_{OH}$	—	GND Reference	3.8	—	—	V
	Lower Limit Output Voltage	$V_{OL}$	—	GND Reference	—	—	0.5	V
	Permissive Load Resistance	$R_{LM}$	—	—	10	—	—	k $\Omega$

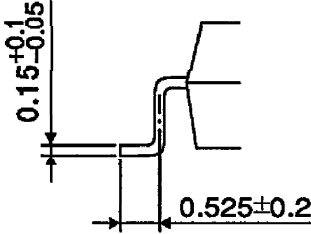
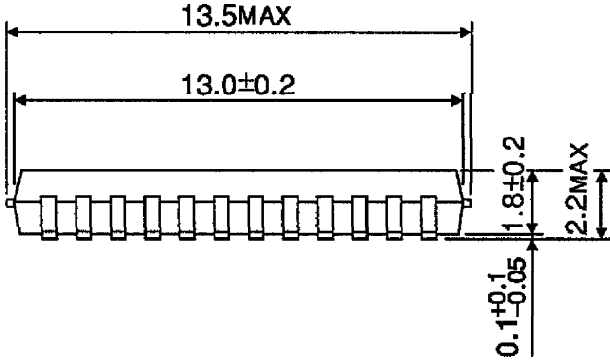
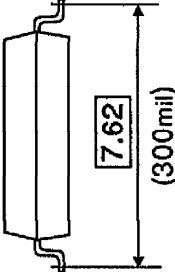
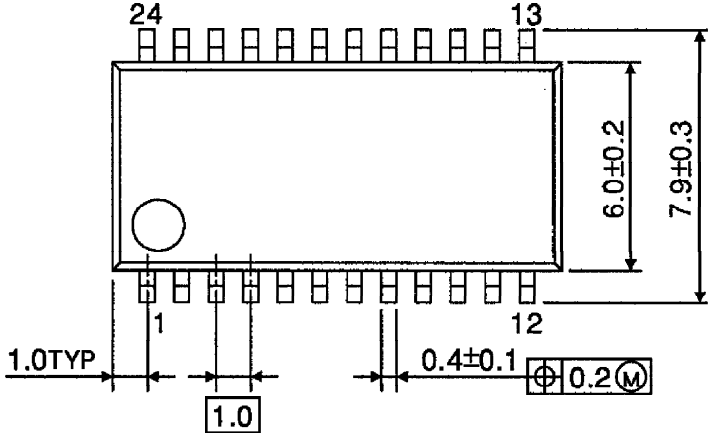
APPLICATION CIRCUIT



TA2066F - 6

OUTLINE DRAWING  
SSOP24-P-300-1.00

Unit : mm



Weight : 0.3g (Typ.)