

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA2066F

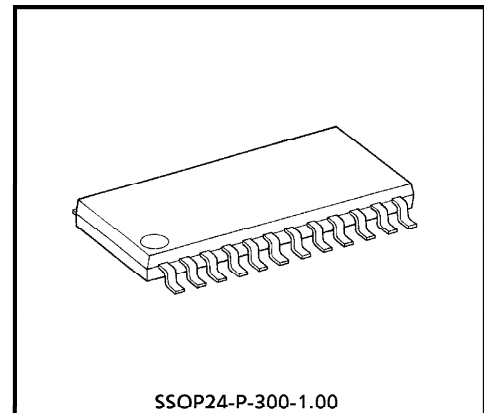
RF AMPLIFIER FOR DIGITAL SERVO CD SYSTEM

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



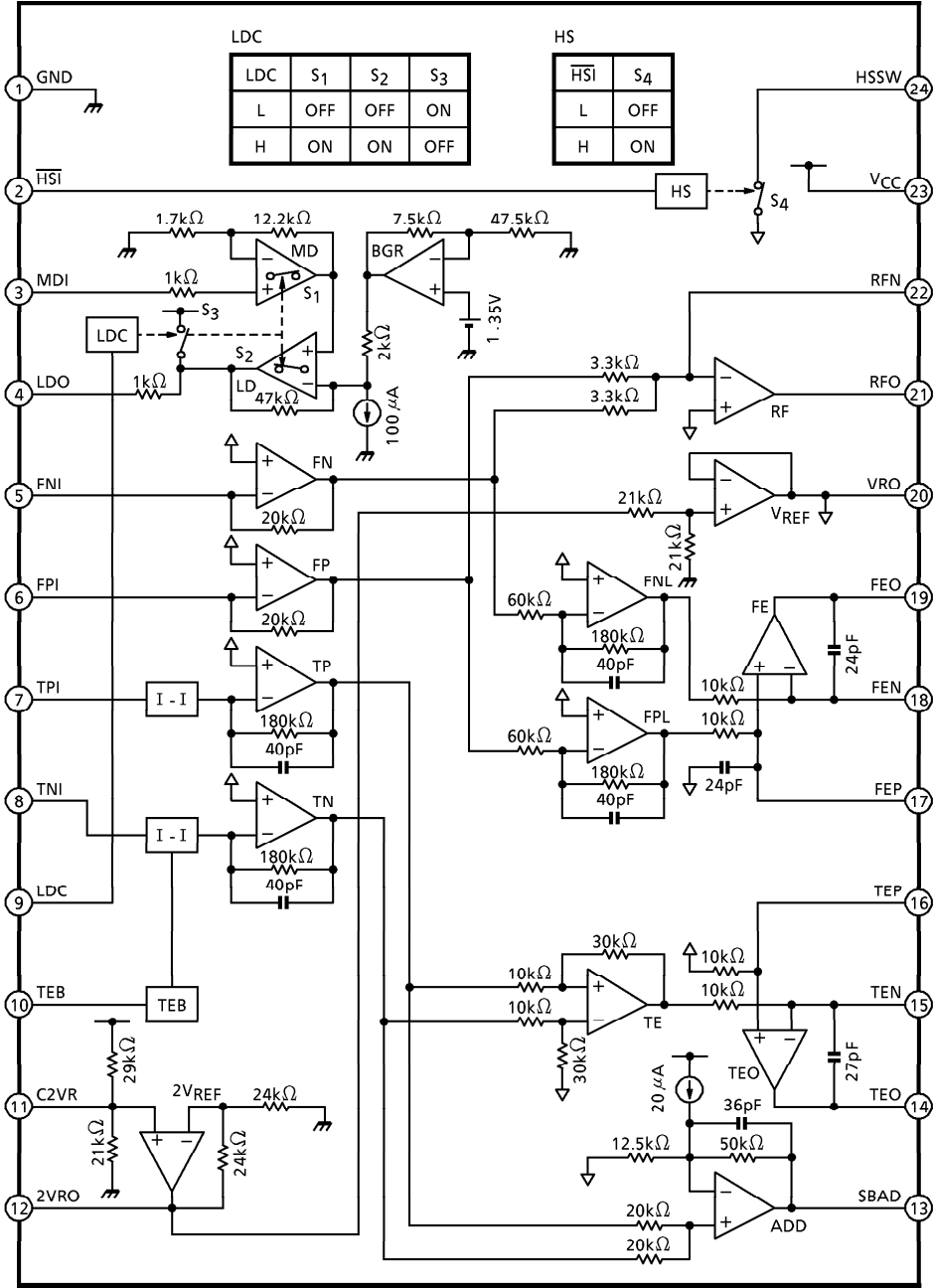
SSOP24-P-300-1.00

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 _{CC} | -0.3~12.0 | V |
| Power Dissipation | P _D | 400 (*) | mW |
| Operating Temperature | T _{opr} | -35~85 | °C |
| Storage Temperature | T _{stg} | -55~150 | °C |

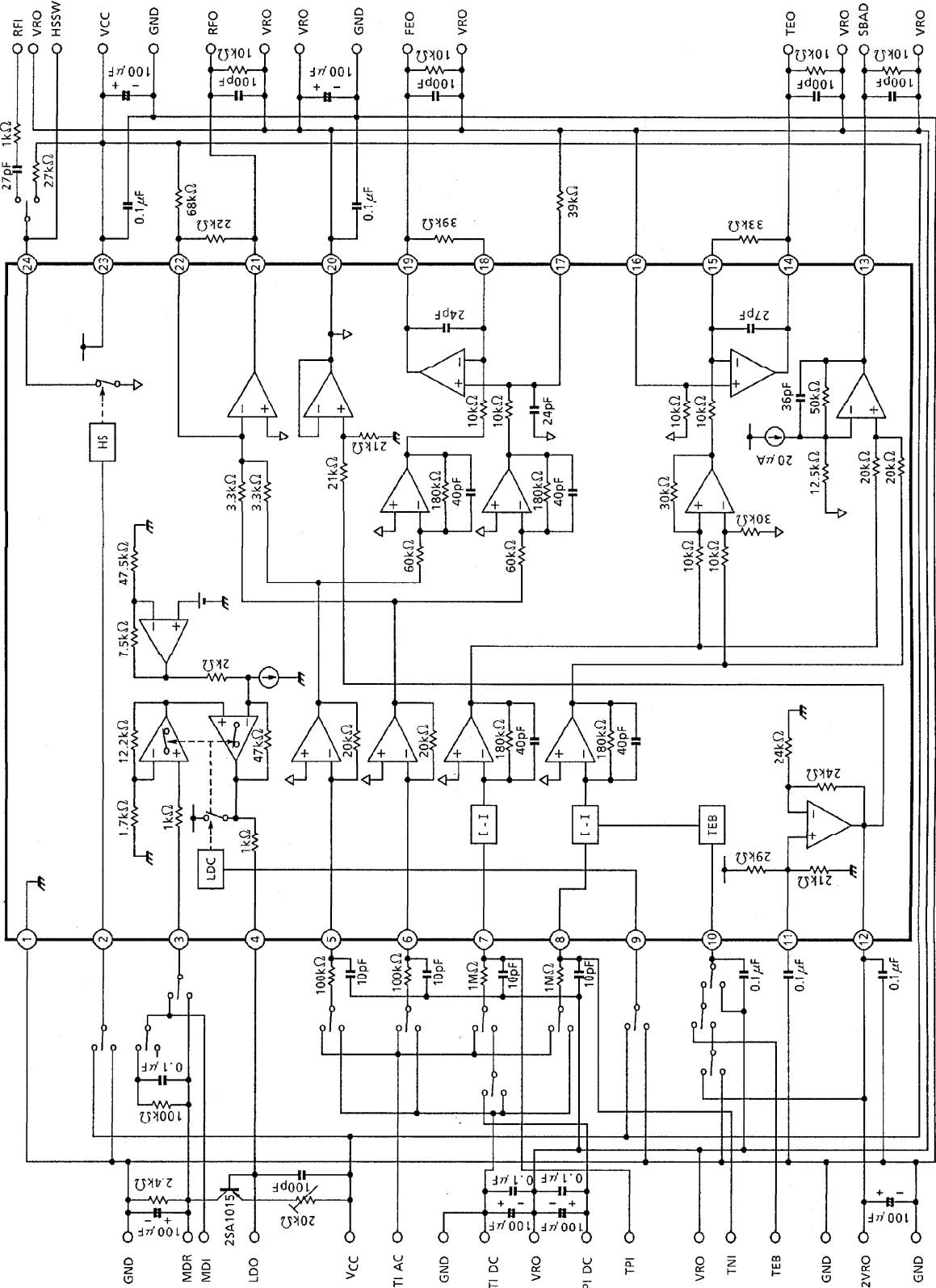
(*) Derated above 25°C in the proportion 3.2mW/°C.

AC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 5V, Ta = 25°C)

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

| CHARACTERISTIC | | SYMBOL | TEST CIRCUIT | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|----------------------------|-------------------------------------|--------------|--------------|--------------------------------------|-------|-------|------------|------------|
| FE | Transfer Resistance | R_T | — | f = 1kHz | 211 | 234 | 257 | k Ω |
| | 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 Ω |
| TE | Transfer Resistance | R_T | — | f = 1kHz | 1.60 | 1.78 | 1.96 | M Ω |
| | Transfer Resistance Adjusting Range | ΔR_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 Ω | |
| SBAD | Transfer Resistance | R_T | — | f = 1kHz | 324 | 450 | 594 | k Ω |
| | 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 Ω |

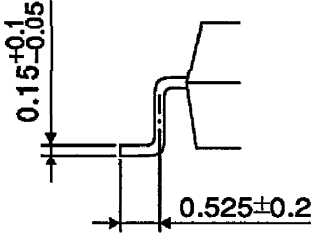
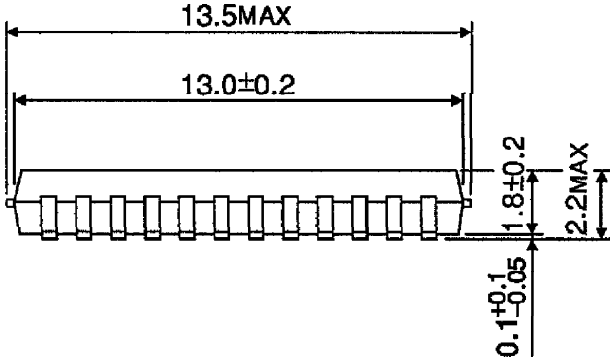
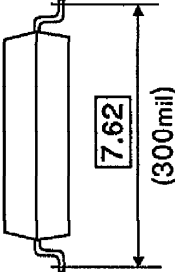
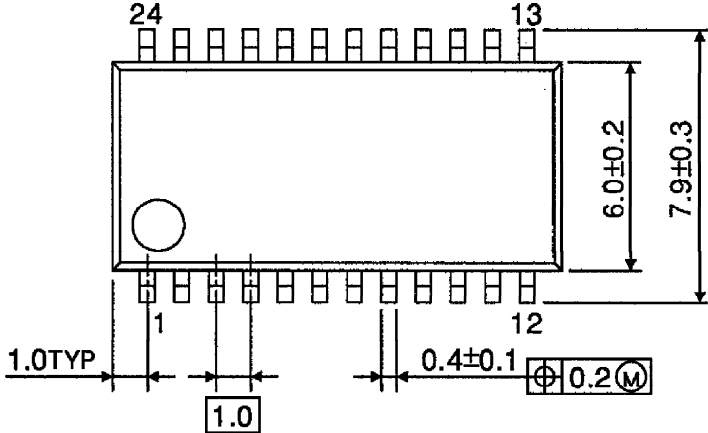
APPLICATION CIRCUIT



TA2066F - 6

OUTLINE DRAWING
SSOP24-P-300-1.00

Unit : mm



Weight : 0.3g (Typ.)