

## TOSHIBA RF POWER AMPLIFIER MODULE

**S-AV36A**

FM RF POWER AMPLIFIER MODULE FOR 80-W COMMERCIAL VHF RADIO APPLICATIONS

- Power Gain: 32 dB (Min.)
- Total Efficiency: 45% (Min.)

**ABSOLUTE MAXIMUM RATINGS ( $T_c = 25^\circ\text{C}$ ,  $I_T < 15\text{ A}$ ,  $Z_G = Z_L = 50\Omega$ )**

| CHARACTERISTICS            | SYMBOL        | TEST CONDITION   | RATING     | UNIT             |
|----------------------------|---------------|--|------------|------------------|
| Maximum Current            | $I_T$         |  | 15         | A                |
| Power Supply Voltage       | $V_{DD}$      | $V_{GG} = 0\text{ V (GND)}$ , RF: none   | 16.5       | V                |
| Control Voltage            | $V_{GG}$      | $10.5 \leq V_{DD} \leq 16.5\text{ V}$ , $P_i = 50\text{ mW}$   | 5.5        | V                |
| Instantaneous Output Power | $P_{omax}$    | $V_{GG} \leq 5.5\text{ V}$ , $P_i = 50\text{ mW}$ , $10.5 \leq V_{DD} \leq 16.5\text{ V}$ , within 2 seconds | 90         | W                |
| Input Power                | $P_i$         | $10.5 \leq V_{DD} \leq 16.5\text{ V}$ , $V_{GG} \leq 5.5\text{ V}$   | 100        | mW               |
| Operating Case Temperature | $T_{c (opr)}$ | $10.5 \leq V_{DD} \leq 16.5\text{ V}$ , $V_{GG} \leq 5.5\text{ V}$ , $P_i = 50\text{ mW}$ (Note 2)           | -30 to 100 | $^\circ\text{C}$ |
| Storage Temperature        | $T_{stg}$     |  | -40 to 110 | $^\circ\text{C}$ |

Note 1: The maximum ratings are the limits that must not be exceeded even for an instant, under worst possible conditions. Exceeding the ratings may cause device damage, ignition, or deterioration. Therefore, when designing the circuitry, derating factors should be applied so that the absolute maximum ratings are not exceeded.

Note 2: The output power rating satisfies the range shown in Figures 1 and 2 according to the operating case temperature. Ensure that the device should be operated within the specified operating range. The figures below indicate the output power obtained 2 seconds after  $P_o$  is generated.



Figure.1 Pomax-Tc

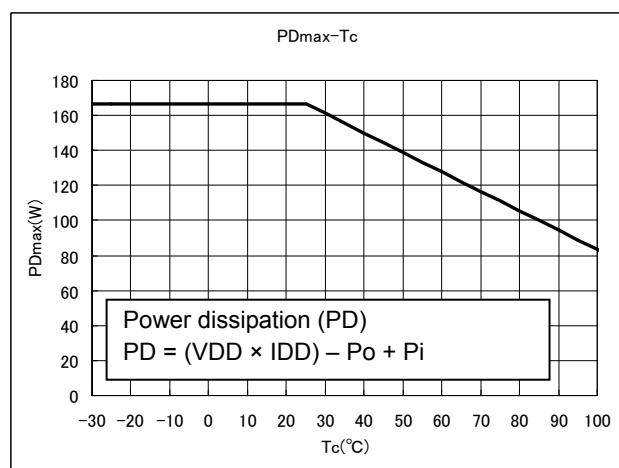


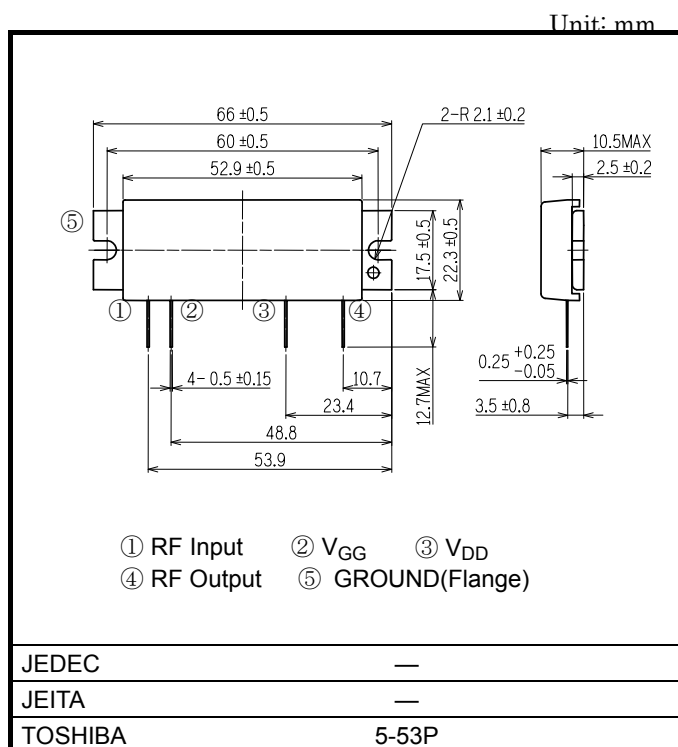
Figure.2 PDmax-Tc

\*When the device is used at  $T_c = 100^\circ\text{C}$ , the output power rating is 64 W as shown in Figure 1. When the power dissipation at  $T_c = 100^\circ\text{C}$  exceeds the rating shown in Figure 2, the output derating is required to limit the dissipation within the specified range.

Note 3: The case temperature is monitored using the screw terminal blocks on the input side that are used for the module implementation.

Note 4: To protect a device from being permanently damaged, the power-on sequence must be as follows (, while the reversed order should be applied when turning off): 1.  $V_{DD}$ , 2.  $P_i$ , 3.  $V_{GG}$

## PACKAGE OUTLINE



Weight: 35 g

ELECTRICAL CHARACTERISTICS (T<sub>c</sub> = 25°C, Z<sub>G</sub> = 50Ω)

| CHARACTERISTICS  | SYMBOL             | TEST CONDITION  | MIN  | TYP. | MAX | UNIT |
|------------------|--------------------|---|--|------|-----|------|
| Frequency Range  | f <sub>range</sub> | —   | 134  | —    | 174 | MHz  |
| Output Power     | P <sub>O</sub>     | V <sub>DD</sub> = 12.5 V<br>V <sub>GG</sub> = 5 V<br>P <sub>i</sub> = 50 mW<br>Z <sub>L</sub> = 50 Ω  | 80   | —    | —   | W    |
| Power Gain       | G <sub>p</sub>     |   | 32   | —    | —   | dB   |
| Total Efficiency | η <sub>T</sub>     |   | 45   | —    | —   | %    |
| Input VSWR       | VSWR <sub>in</sub> |   | —  | —    | 3.0 | —    |
| Second Harmonic  | 2nd HRM            |   | —  | —    | -25 | dB   |
| Third Harmonic   | 3rd HRM            |   | —  | —    | -30 | dB   |
| Ruggedness       | —                  | 10.5 V ≤ V <sub>DD</sub> ≤ 16.5 V, 0 V ≤ V <sub>GG</sub> ≤ V <sub>GGa</sub><br>(V <sub>GG</sub> = V <sub>GGa</sub> @ P <sub>O</sub> = 80 W)<br>P <sub>i</sub> = 50 mW<br>P <sub>O</sub> = 80 W (Adjusted via V <sub>GG</sub> @ Z <sub>L</sub> = 50Ω)<br>VSWR LOAD 20: 1 ALL PHASE (@ 2 s) | No Damage                                  |      |     | —    |
| Stability        | —                  | 10.5 V ≤ V <sub>DD</sub> ≤ 16.5 V, 0 V ≤ V <sub>GG</sub> ≤ V <sub>GGa</sub><br>(V <sub>GG</sub> = V <sub>GGa</sub> @ P <sub>O</sub> = 80 W)<br>P <sub>i</sub> = 50 mW<br>P <sub>O</sub> ≤ 80 W (Adjusted via V <sub>GG</sub> @ Z <sub>L</sub> = 50Ω)<br>VSWR LOAD 3: 1 ALL PHASE          | No spurious output<br>of -60 dB or greater |      |     | —    |

Note 5: The output power is intended to follow the rating provided in Figure 1 in Note 2.

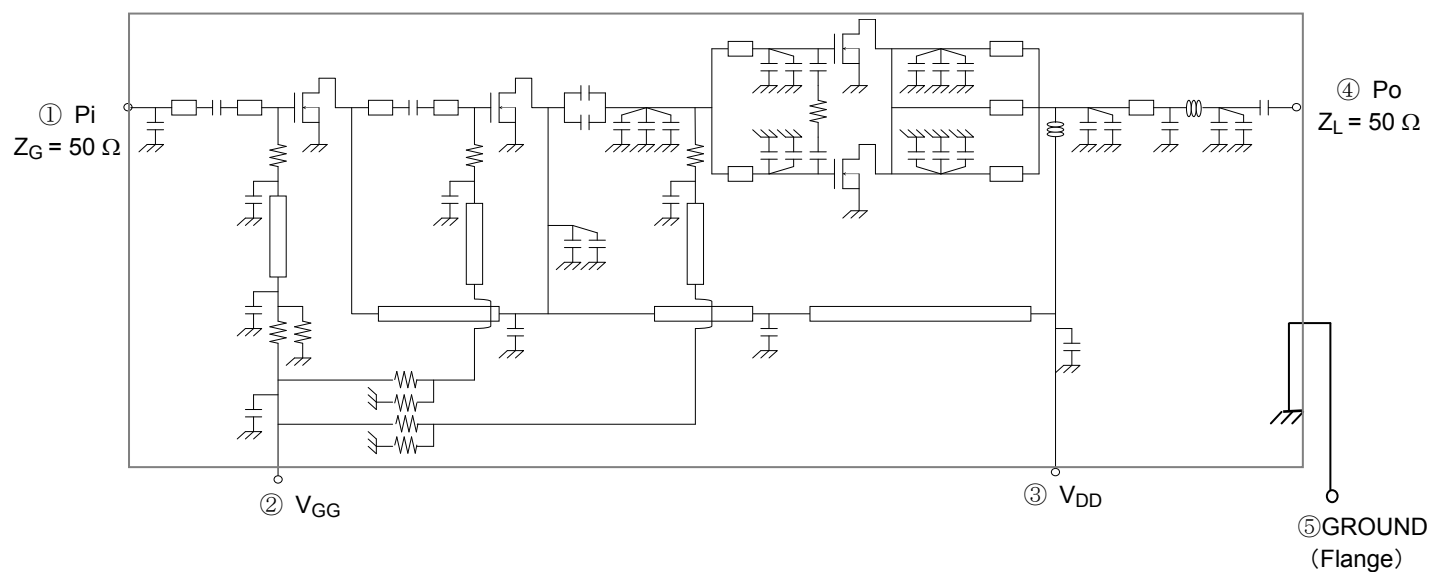
Note 6: Stability

Measurements are performed under the conditions where VSWR is at 3:1 through all phases over the whole frequency range, and they are guaranteed only under those conditions. Even though it is guaranteed to be stable where VSWR is at 3:1, the VSWR load over the operating frequency should be designed to be 50 Ω. At the same time, ensure that the VSWR load does not deviate much from 50Ω even for a moment, nor deviate even a little from 50Ω continually. The S-AU82AL is not intended for such operations, and proper operation under such conditions is not guaranteed due to the possibilities of heat generation in the module and its applications.

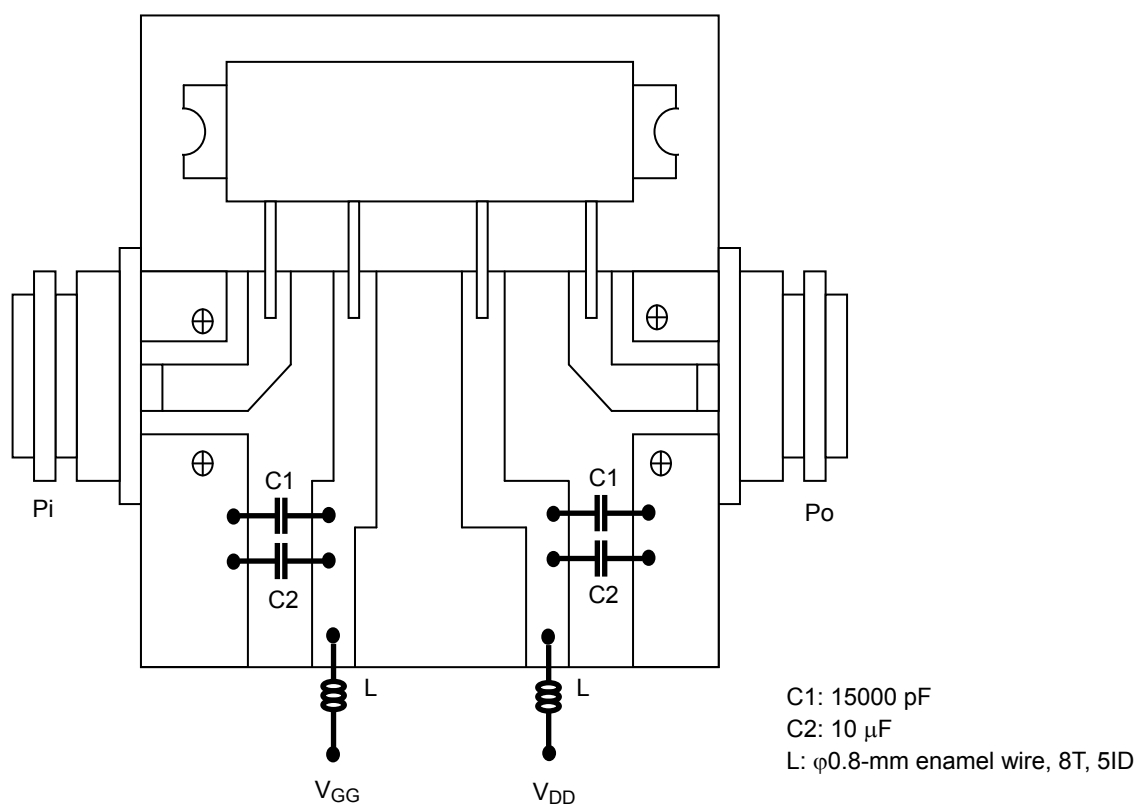
**HANDLING PRECAUTIONS**

- Since this product has a protective cap, care should be taken to avoid applying an excessive impact and allowing foreign objects to get inside when handling this product. Also, please do not remove a cap. If the cap is removed, the foreign object inside the module or the applied impact may lead IC failure, causing smoke or ignition.
- Since this product is structurally susceptible to static electricity, protections against the static electricity should be applied to objects that may come in direct contact with devices, such as worktables, equipment, operators and solder irons.
- This product is not designed nor intended to perform a continuous transmission for applications like a base station. Please do not use this product for such applications, for the reliability cannot be guaranteed.
- This product is intended to be used for a single operation (single-device operation). A proper operation is not guaranteed for a parallel operation. A parallel operation should be performed in accordance with your own good judgment.
- Mounting method
  - The flatness of a heat sink must not exceed 50  $\mu\text{m}$ . If the flatness exceeds 50  $\mu\text{m}$ , the device may experience an unexpected stress that may lead to module breakdown due to damage or ignition in the substrate inside a module and other module parts.
  - Please apply thermal compound between a module and a heat sink to improve the adhesive property.
  - Use a 4-mm diameter screw with the clamping screw torque of 1.2 to 1.5 Nm.
  - Please solder the module leads after the screw is clamped.

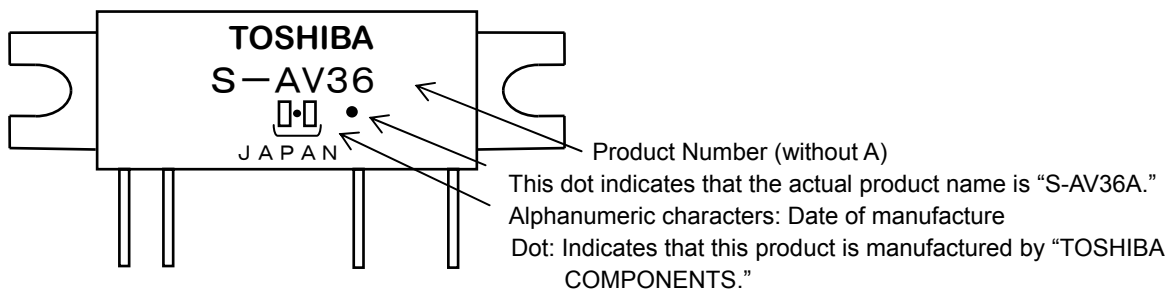
## EQUIVALENT CIRCUIT



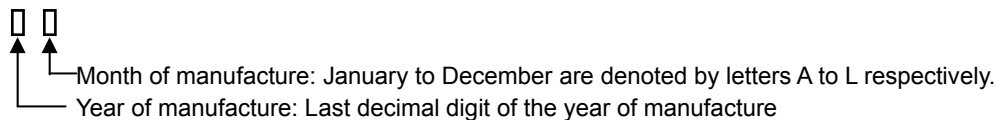
## TEST FIXTURE



## MARKING



## Explanation of Lot No.



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