

## TOSHIBA RF POWER AMPLIFIER MODULE

**S-AV35**

OFM RF POWER AMPLIFIER MODULE for VHF MARINE BAND

- Output Power :32W (Min.)
- Power Gain :35.0dB (Min.)
- Total Efficiency:50% (Min.)

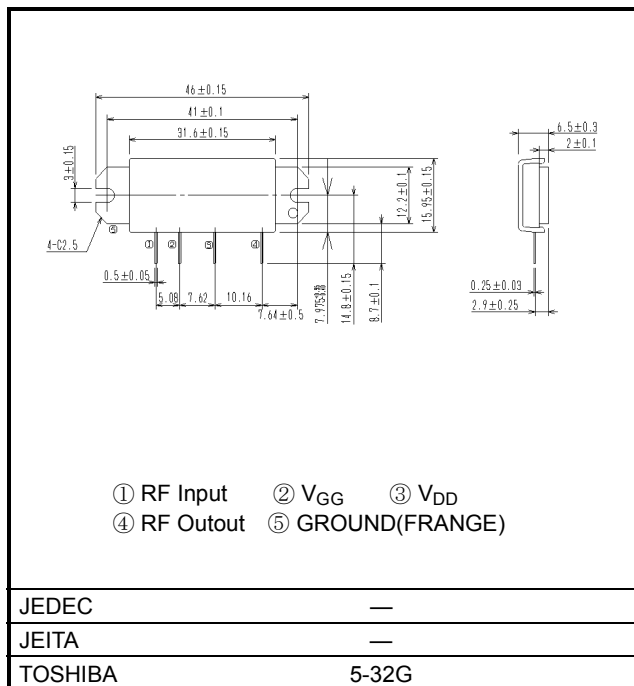
**MAXIMUM RATINGS ( $T_c = 25^\circ\text{C}$ ,  $Z_G = Z_L = 50\ \Omega$ )**

| CHARACTERISTIC                   | SYMBOL              | TEST CONDITION                                                                         | RATING  | UNIT             |
|----------------------------------|---------------------|----------------------------------------------------------------------------------------|---------|------------------|
| DC Supply Voltage                | $V_{DD}$            | $V_{GG}=0\text{V}$ , $P_i=0\text{mW}$                                                  | 16.5    | V                |
| DC Supply Voltage                | $V_{DD}$            | $V_{GG}\leq 5\text{V}$ , $P_i=50\text{mW}$ , $P_o\leq 45\text{W}$                      | 16.5    | V                |
| DC Supply Voltage                | $V_{GG}$            | $V_{DD}\leq 12.5\text{V}$ , $P_i=50\text{mW}$                                          | 5.5     | V                |
| Total Current                    | $I_T$               | $V_{DD}\leq 12.5\text{V}$ , $P_i=50\text{mW}$                                          | 8       | A                |
| Input Power                      | $P_i$               | $V_{DD}\leq 12.5\text{V}$ , $V_{GG}\leq 5\text{V}$                                     | 20      | mW               |
| Output Power                     | $P_o$               | $12.5\text{V} < V_{DD} \leq 16.5\text{V}$ , $V_{GG}\leq 5\text{V}$ , $P_i=50\text{mW}$ | 45      | W                |
| Operating Case Temperature Range | $T_{c(\text{opr})}$ | $V_{GG}\leq 5\text{V}$                                                                 | -30~100 | $^\circ\text{C}$ |
| Storage Temperature Range        | $T_{\text{stg}}$    |                                                                                        | -40~110 | $^\circ\text{C}$ |

Caution: This maximum rating given in a sheet guarantees each item independently. When two items or more of maximum rated items joins a device at once. It becomes the outside of a guarantee. Please design in circuit to make it always operate within this regulation also on the worst condition.

**PACKAGE OUTLINE**

Unit in mm



Weight: 11.8g

**ELECTRICAL CHARACTERISTICS ( $T_c = 25^\circ\text{C}$ ,  $Z_G = 50\ \Omega$ )**

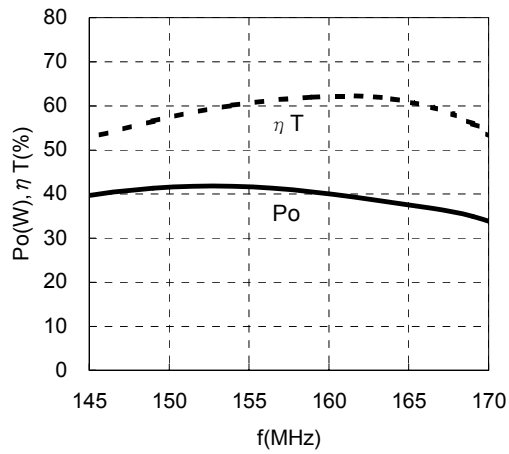
| CHARACTERISTIC   | SYMBOL             | TEST CONDITION                                                                                                                                                                                | MIN.                                                     | TYP. | MAX. | UNIT |
|------------------|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|------|------|------|
| Frequency Range  | $f_{\text{range}}$ | —                                                                                                                                                                                             | 154                                                      | —    | 162  | MHz  |
| Output Power 1   | $P_{o1}$           | $V_{DD} = 12.5\text{V}$<br>$V_{GG} = 5\text{V}$<br>$P_i = 10\text{mW}$<br>$Z_L = 50\ \Omega$                                                                                                  | 32                                                       | —    | —    | W    |
| Power Gain 1     | $G_{p1}$           |                                                                                                                                                                                               | 35.0                                                     | —    | —    | dB   |
| Total Efficiency | $\eta_T$           |                                                                                                                                                                                               | 50                                                       | —    | —    | %    |
| Input VSWR       | VSWR <sub>in</sub> |                                                                                                                                                                                               | —                                                        | —    | 3.0  | —    |
| Second Harmonic  | 2nd HRM            |                                                                                                                                                                                               | —                                                        | —    | -30  | dB   |
| Third Harmonic   | 3rd HRM            |                                                                                                                                                                                               | —                                                        | —    | -30  | dB   |
| Output Power 2   | $P_{o2}$           | $V_{DD} = 10.5\text{V}$ , $V_{GG} = 5\text{V}$<br>$P_i = 10\text{mW}$ , $Z_L = 50\ \Omega$                                                                                                    | 20                                                       | —    | —    | W    |
| Power Gain 2     | $G_{p2}$           |                                                                                                                                                                                               | 33.0                                                     | —    | —    | dB   |
| Load Mismatch    | —                  | $V_{DD} = 15\text{V}$ , $P_i = 10\text{mW}$<br>$P_o = 32\text{W}$ ( $V_{GG} = \text{adjust. @ } Z_L = 50\ \Omega$ )<br>VSWR LOAD 10: 1 ALL PHASE                                              | No Degradation                                           |      |      | —    |
| Stability        | —                  | $V_{DD} = 10.5$ to $16.5\text{V}$ , $V_{GG} = 0$ to $5\text{V}$<br>$P_i = 10\text{mW}$<br>$P_o \leq 32\text{W}$ ( $V_{GG} = \text{adjust. @ } Z_L = 50\ \Omega$ )<br>VSWR LOAD 3: 1 ALL PHASE | All spurious output<br>than 60dB below<br>desired signal |      |      | —    |

**Caution**

- This product has intersetting cap. Please pay attention for exceeding stress and foreign matter in your application. And not to take away the cap.
- Do not break, cut, crush or dissolve chemically. Dispose of this product properly according to law. Do not intermingle with normal industrial or domestic waste.
- This product is electrostatic sensitivity, please handle with caution.
- This product is flowed high current for a VDD terminal at both RF ON and RF OFF. And it has large calorific value for high output poer. So please use it within the limit of the maximum rating.  
The view of the maximum rating of our company,  
"The absolute maximum ratings are rated values which must not be exceeded during operatin, even for an instant. And it guarantees each item independently. When two items or more of maximum rated items joins a device at once. It becomes the outside of a guarantee. "

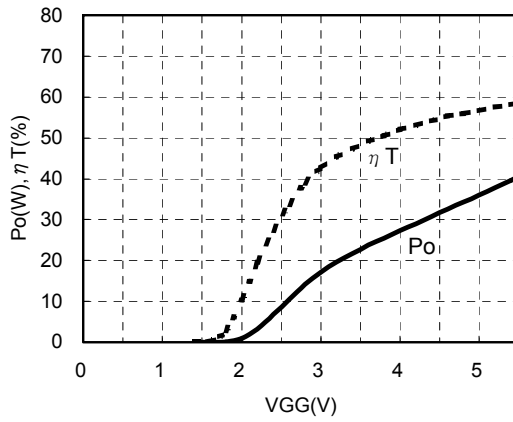
The schematic diagram illustrates a two-stage CMOS differential amplifier. The input port ①  $P_i$  is connected to the gates of the first stage transistors through a series combination of a capacitor and a resistor, with a source impedance  $Z_G = 50\ \Omega$ . The output of the first stage is connected to the gates of the second stage transistors. The output port ④  $P_o$  is connected to the drains of the second stage transistors through a series combination of a resistor and a capacitor, with a load impedance  $Z_L = 50\ \Omega$ . The circuit is powered by a differential-mode supply  $V_{DD}$  (port ③) and a common-mode supply  $V_{GG}$  (port ②). The ground reference is labeled ⑤ GROUND (FRANGE). The circuit includes various passive components (resistors and capacitors) and active components (CMOS transistors) connected to ground symbols.

f-Po,  $\eta T$



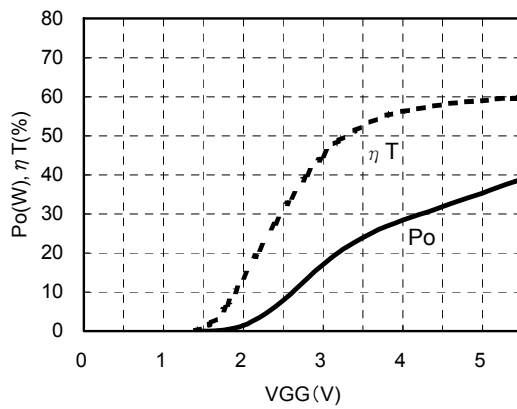
$V_{DD} = 12.5V$ ,  $P_i = 10mW$   
 $Z_G = Z_L = 50\Omega$

VGG - Po,  $\eta T$



$f = 154MHz$   
 $V_{DD} = 12.5V$ ,  $P_i = 10mW$   
 $Z_G = Z_L = 50\Omega$

VGG - Po,  $\eta T$



$f = 162MHz$   
 $V_{DD} = 12.5V$ ,  $P_i = 10mW$   
 $Z_G = Z_L = 50\Omega$

## CAUTION

These are only typical curves and devices are not necessarily guaranteed at these curves.

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