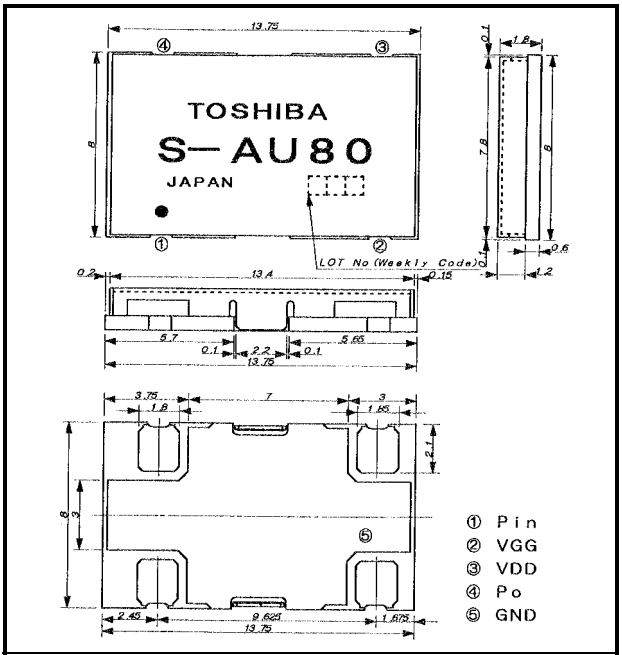
TOSHIBA RF Power Amplifire Module

# S - A U 8 0

900 MHz Band Amplifier Applications (GSM)

Unit: mm

- Output Power: $P_o$ = 35.0 dBmW (typ.)
- Power Gain: $G_p$ = 35.0 dB (typ.)
- Total Efficiency: $\eta T$ = 43% (typ.)




| | |
|---|---|
| JEDEC | — |
| EIAJ | — |
| TOSHIBA | 5-14A |

## Maximum Ratings (Ta = 25°C)

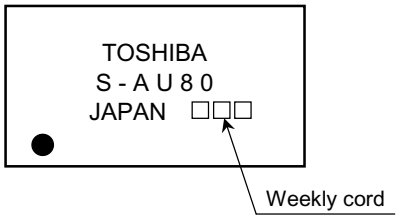
| Characteristic | Symbol | Rating | Unit |
|---|---|---|---|
| DC Supply Voltage | $V_{DD}$ | 8 (Note1) | V |
| DC Supply Voltage | $V_{GG}$ | 5 (Note2) | V |
| DC Current | $I_{DD}$ | 5 | A |
| Input Power | $P_i$ | 6 | dBmW |
| Output Power | $P_o$ | 36 (Note3) | dBmW |
| Operating Case Temperature Range | $T_{c\ (opr)}$ | −30~85 | °C |
| Storage Temperature Range | $T_{stg}$ | −40~110 | °C |

Note1: This value is specified at no operation ($V_{GG}$ = 0 V, $P_i$ = none)

Note2: This value is specified at no operation ($V_{DD}$ = 0 V, $P_i$ = none)

Note3: This value is specified at no 50 Ω load operation

## Type Name




961001EAA1

## Electrical Characteristics (Ta = 25°C)

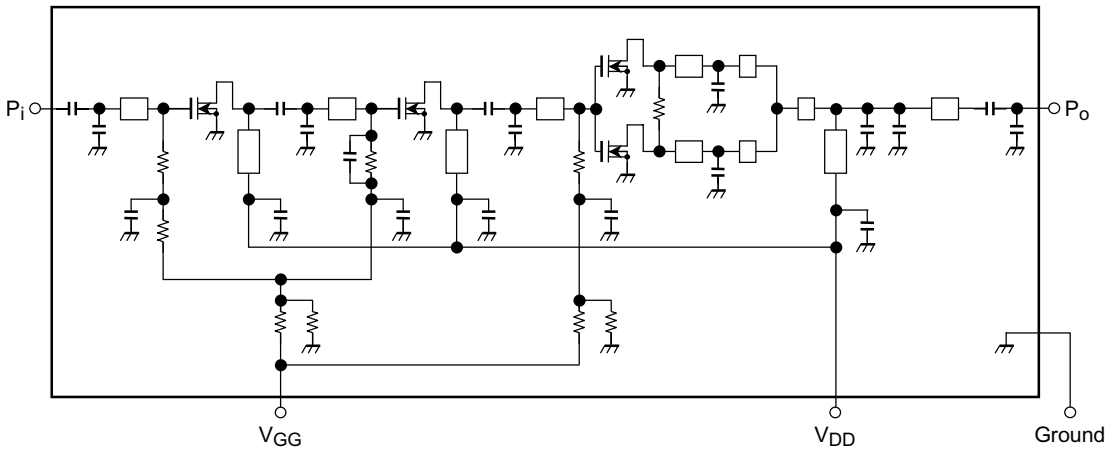
| Characteristic | Symbol | Test Condition | | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|---|
| Frequency range | $f_{range}$ | — | | 880 | — | 915 | MHz |
| Leakage current | $I_{leak}$ | $V_{DD}$ = 6.0, $V_{GG}$ = 0 V | | — | 500 | — | μA |
| Output power | $P_o$ | $P_i$ = 0 dBmW, $V_{DD}$ = 3.6 V, $V_{GG} \leqq$ 2.5 V<br>$Z_G = Z_L$ = 50 Ω | | 34.5 | 35.0 | — | dBmW |
| Power gain | $G_p$ | | | 34.5 | 35.0 | — | dB |
| Total efficiency (Note4) | Eff | $P_i$ = 0 dBmW, $V_{DD}$ = 3.6 V, $V_{GG} \leqq$ 2.5 V<br>$P_o$ = 34.5 dBmW, $Z_G = Z_L$ = 50 Ω | | 37 | 43 | — | % |
| Input VSWR | VSWR | $P_i$ = 0 dBmW, $V_{DD}$ = 3.6 V, $V_{GG} \leqq$ 2.5 V<br>$P_o$ = 34.5 dBmW, $Z_G = Z_L$ = 50 Ω | | — | — | 3.0 | — |
| Control current | $I_{cont}$ | | | — | 0.5 | 1.0 | mA |
| 2nd harmonics | $2^{nd}$ HRM | | | — | −45 | −35 | dB |
| 3rd harmonics | $3^{rd}$ HRM | | | — | −50 | −40 | dB |
| Low voltage power | $P_o$-L | $P_i$ = 0 dBmW, $V_{DD}$ = 3.2 V, $V_{GG} \leqq$ 2.5 V<br>$Z_G = Z_L$ = 50 Ω, $T_c$ = 85°C | | 33.5 | 34.0 | — | dBmW |
| Isolation | $P_o$-iso | $P_i$ = 0 dBmW, $V_{DD}$ = 3.6 V, $V_{GG}$ = 0.3 V<br>$Z_G = Z_L$ = 50 Ω | | — | −40 | −37 | dBmW |
| AM-AM conversion | $AM_{con}$ | $P_{i1}$ = 0 dBmW, $P_{i2}$ = −40 dBmW<br>$P_{in2} = P_{i1}$ + 200 kHz, $V_{DD}$ = 3.6 V<br>$P_o$ = 7~34.5 dBmW ($V_{GG}$ = adjust)<br>$Z_G = Z_L$ = 50 Ω | f0 − 200 kHz | — | −30 | — | dB |
| | | | f0 + 200 kHz | — | −30 | — | dB |
| Switching time (Note5) | $t_r/t_f$ | $V_{DD}$ = 3.6 V<br>$P_o$ = 0~34.5 dBmW ($V_{GG}$ = adjust)<br>$P_i$ = 0 dBmW, $Z_G = Z_L$ = 50 Ω | | — | 1.0 | — | μs |
| Noise Power | NRB | f0 = 915 MHz, $P_{in}$ = 0 dBmW<br>$P_o$ = 34.5 dBmW, RBW = 100 kHz<br>$V_{DD}$ = 3.6 V, $V_{GG}$ = adjust | f0 + 20 MHz | — | −82 | — | dBmW |
| | | | f0 + 10 MHz | — | −78 | — | dBmW |
| Load Mismatch | — | $P_i$ = 0 dBmW, $V_{DD}$ = 3.2~4.3 V<br>$P_o \leqq$ 34.5 dBmW ($V_{GG}$ = adjust), $Z_G$ = 50 Ω<br>VSWR LOAD 6:1 ALL PHASE | | No degradation | | | — |
| Stability | — | $P_i$ = 0 dBmW, $V_{DD}$ = 3.2~4.3 V<br>$V_{GG}$ = 0~2.5 V, $Z_G$ = 50 Ω<br>$P_o \leqq$ 34.5 dBmW (@$Z_L$ = 50 Ω)<br>VSWR LOAD 6:1 ALL PHASE | | All spurious output than 60 dB below desired signal | | | — |

Note4: Output power $P_o$ is defined at the root point of the module output pin $P_o$.
The coefficient of output power loss in the P.C.B. output is showed as follows:
1/(S21)^2 = 1/(0.9809)^2 = 1.04

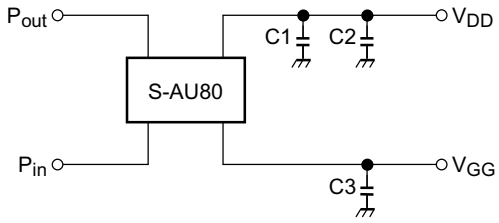
Note5: GSM pulse is applied to $V_{GG}$ (1/8 duty 575 μs)

*: This transistor is the electrostatic sensitive device. Please handle with caution.

## Schematic

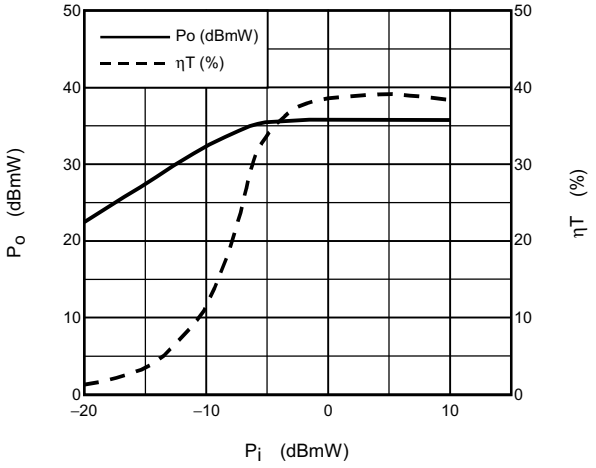



## Test Circuit

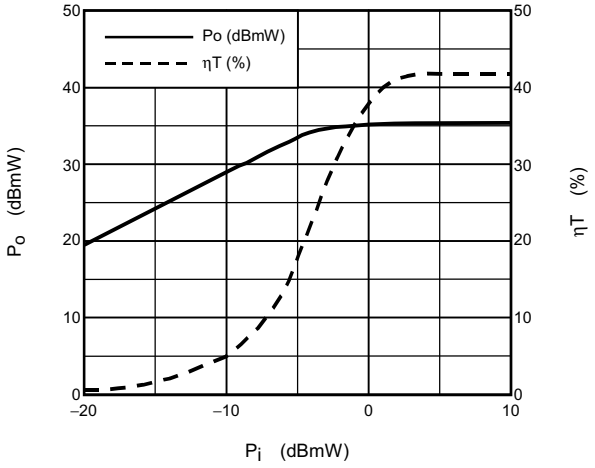



C1: 10000 pF
C2: 10 µF
C3: 100 pF

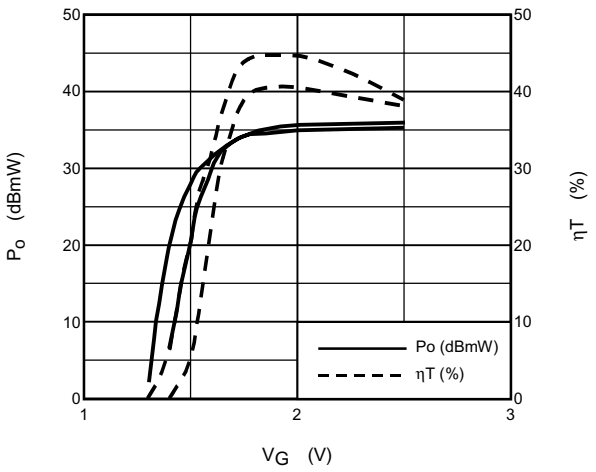
$P_i - P_o$ (f = 880 MHz, $T_c$ = 25°C)



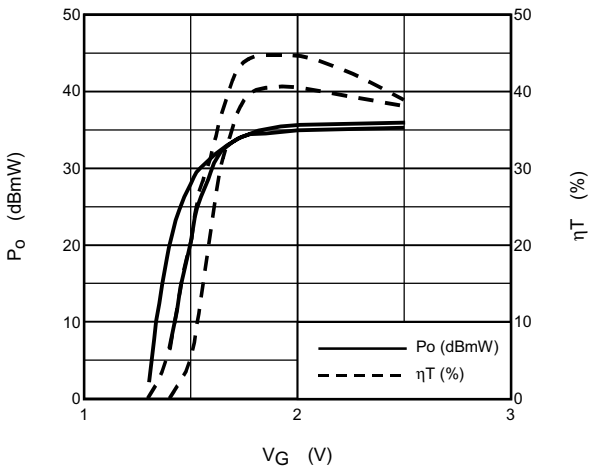

$P_i - P_o$ (f = 915 MHz, $T_c$ = 25°C)



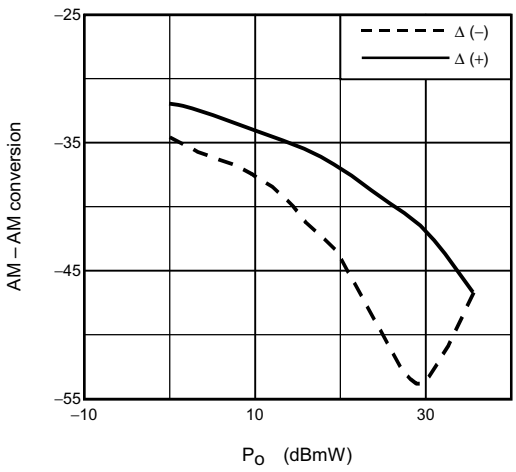

$V_G - P_o$ (f = 880 MHz, $T_c$ = 25°C)



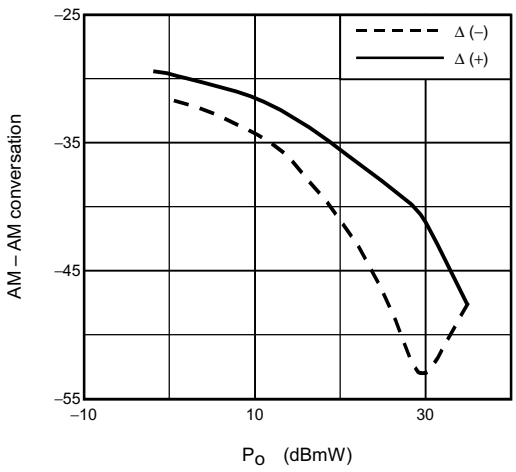

$V_G - P_o$ (f = 915 MHz, $T_c$ = 25°C)




AM – AM conversion (f = 880 MHz)




AM – AM conversion (f = 915 MHz)




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