

# 2SK3656

## VHF- and UHF-band Amplifier Applications

(Note)The TOSHIBA products listed in this document are intended for high frequency Power Amplifier of telecommunications equipment. These TOSHIBA products are neither intended nor warranted for any other use. Do not use these TOSHIBA products listed in this document except for high frequency Power Amplifier of telecommunications equipment.

- Output power:  $P_O = 28.4 \text{ dBmW}$  (typ)
- Gain:  $G_P = 15.4 \text{ dB}$  (typ)
- Drain efficiency:  $\eta_D = 64\%$  (typ)

## Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

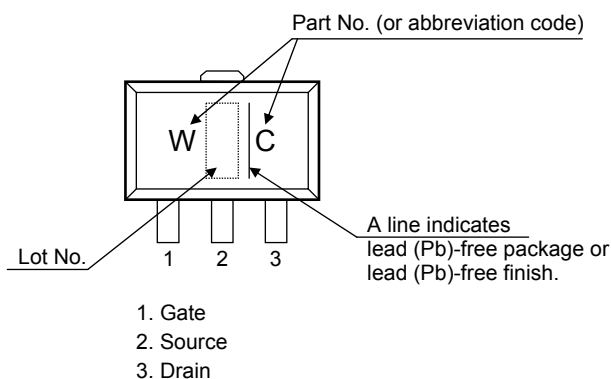
Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DS}$	7.5	V
Gate-source voltage	$V_{GS}$ (Note 1)	3.5	V
Drain current	$I_D$	0.5	A
Power dissipation	$P_D$ (Note 2)	3	W
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-45~150	$^\circ\text{C}$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

Note 1: Operating Ranges: 0~3.5V

Note 2:  $T_c = 25^\circ\text{C}$  (When mounted on a 1.6 mm glass epoxy PCB)

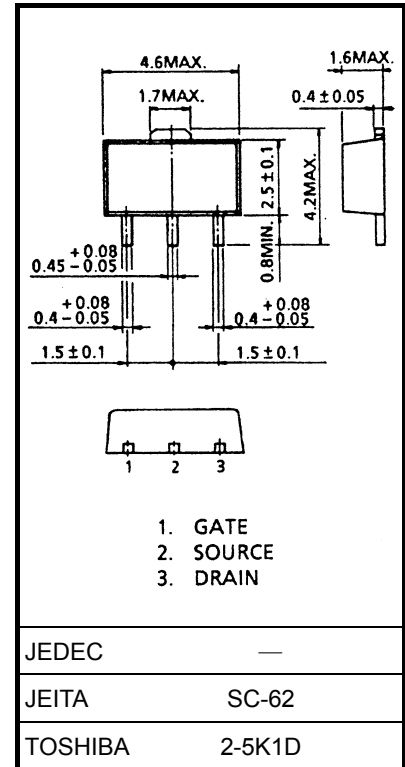
## Marking



**Caution:** This device is sensitive to electrostatic discharge.

Please make enough tool and equipment earthed when you handle.

Unit: mm



Weight: 0.05 g (typ.)

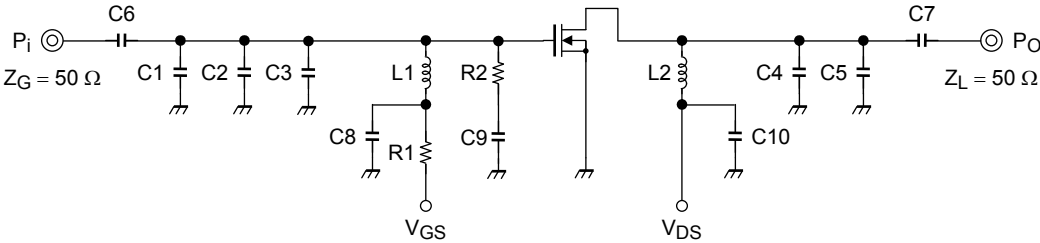
**Electrical Characteristics (Ta = 25°C)**

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Output power	P <sub>O</sub>	V <sub>DS</sub> = 3.6 V, I <sub>idle</sub> = 50 mA (V <sub>GS</sub> = adjust), f = 470 MHz, P <sub>i</sub> = 13dBmW,	27.5	28.4	—	dBmW
Drain efficiency	η <sub>D</sub>		50	64	—	%
Power gain	G <sub>P</sub>		—	15.4	—	dB
Threshold voltage	V <sub>th</sub>	V <sub>DS</sub> = 3.6 V, I <sub>D</sub> = 0.5 mA	0.2	—	1.2	V
Drain cut-off current	I <sub>DSS</sub>	V <sub>DS</sub> = 7.5 V, V <sub>GS</sub> = 0 V	—	—	10	μA
Gate-source leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = 3.5 V, V <sub>DS</sub> = 0 V	—	—	5	μA
Load Mismatch (Note 3)	—	V <sub>DS</sub> = 3.6 V, f = 470 MHz, P <sub>i</sub> = 13dBmW, P <sub>o</sub> = 27dBmW (V <sub>GS</sub> = adjust), VSWR LOAD 10:1 all phase	No Degradation			—

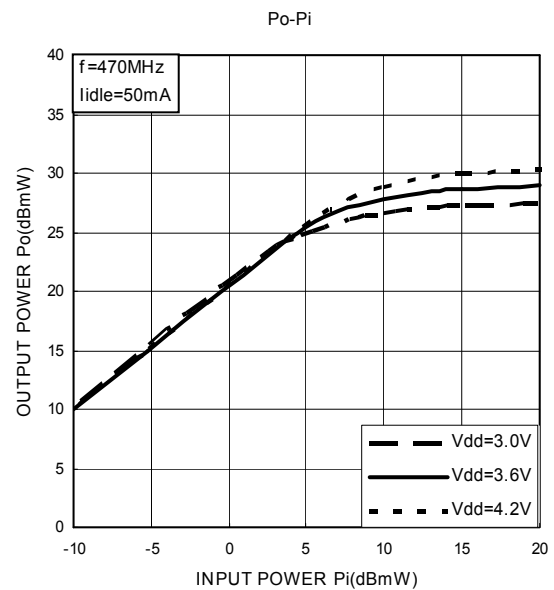
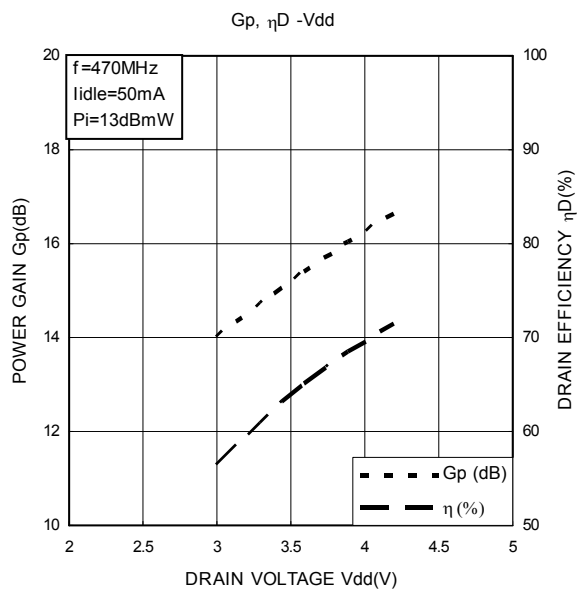
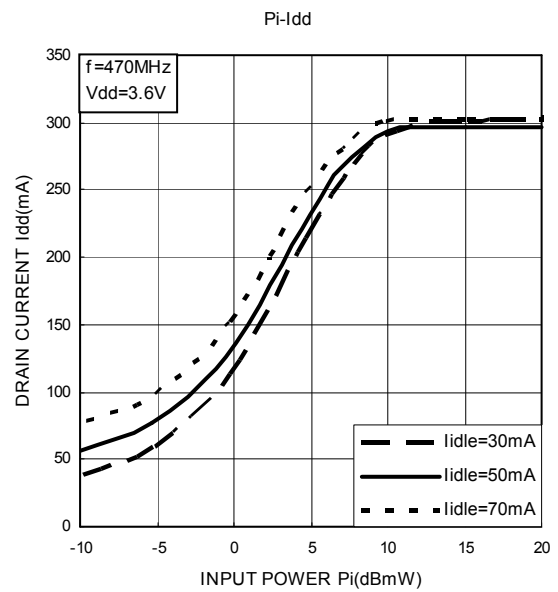
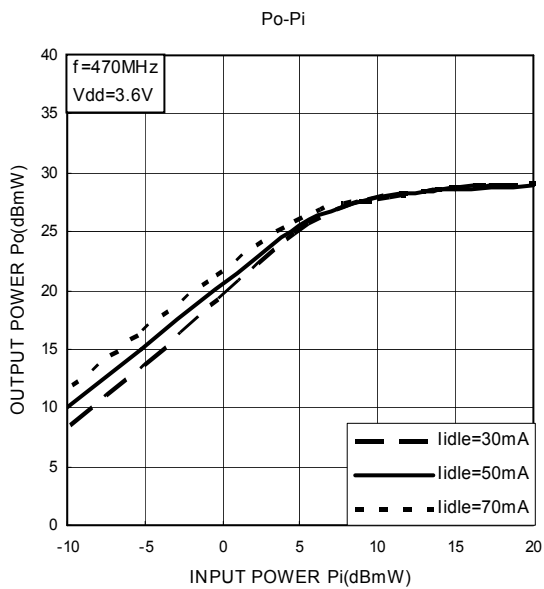
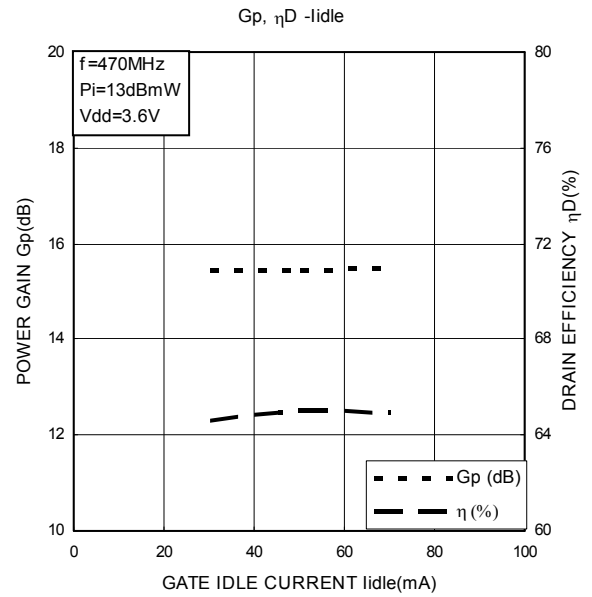
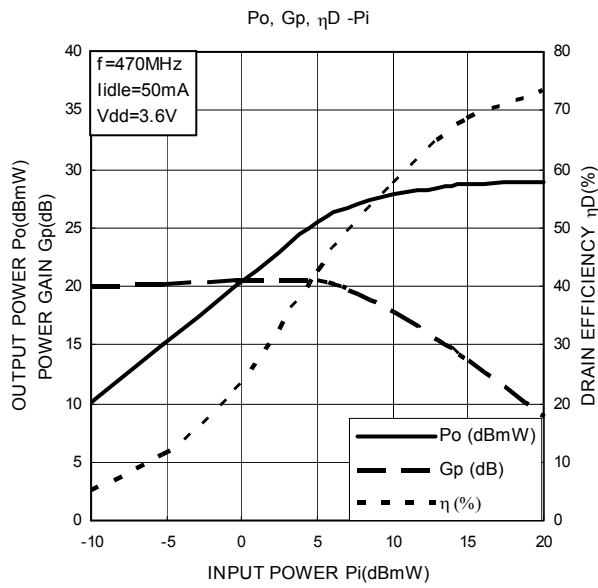
Note 3: These characteristic values are measured using measurement tools specified by Toshiba.

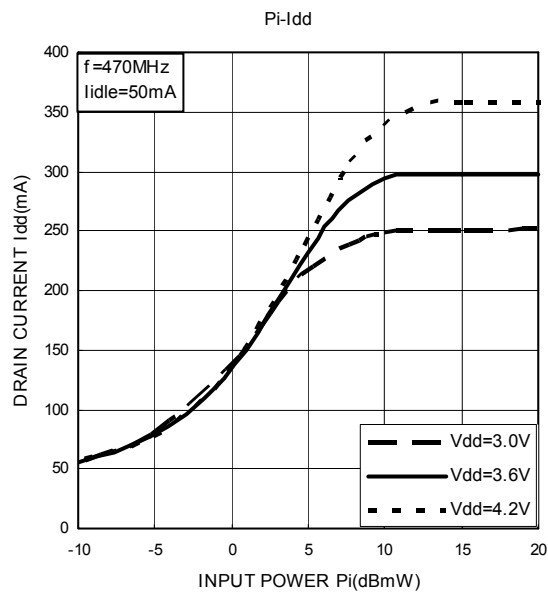
**Output Power Test Fixture**

(Test Condition: f = 470 MHz, V<sub>DS</sub> = 3.6 V, I<sub>idle</sub> = 50 mA, P<sub>i</sub> = 13 dBmW)



- |               |                                    |            |
|---------------|------------------------------------|------------|
| C1: 7 pF      | L1: φ0.6 mm enamel wire, 5.5ID, 5T | R1: 6.8 kΩ |
| C2: 10 pF     | L2: φ0.6 mm enamel wire, 5.5ID, 7T | R2: 56 Ω   |
| C3: 5 pF      |                                    |            |
| C4: 13 pF     |                                    |            |
| C5: 8 pF      |                                    |            |
| C6: 2200 pF   |                                    |            |
| C7: 2200 pF   |                                    |            |
| C8: 10000 pF  |                                    |            |
| C9: 2200 pF   |                                    |            |
| C10: 10000 pF |                                    |            |





Note 4: These are only typical curves and devices are not necessarily guaranteed at these curves.

**RESTRICTIONS ON PRODUCT USE**

20070701-EN GENERAL

- The information contained herein is subject to change without notice.
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.  
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