

TOSHIBA FIELD EFFECT TRANSISTOR
GaAs N CHANNEL SINGLE GATE MODULATION DOPE TYPE

2SK2331

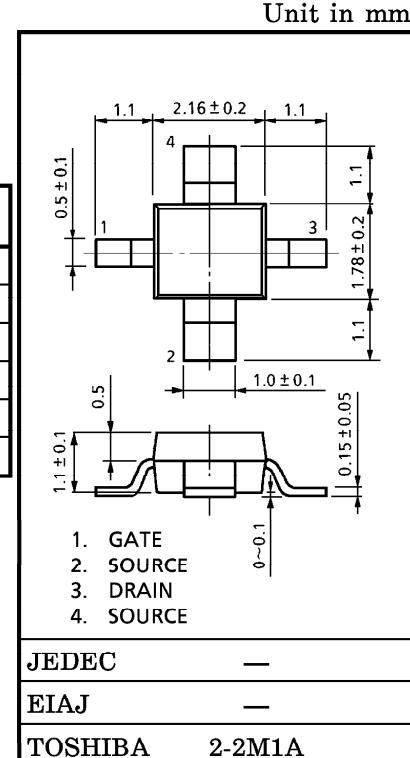
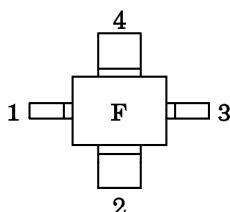
SHF BAND LOW NOISE AMPLIFIER APPLICATIONS

- Low Noise Figure : $NF = 0.45\text{dB}$ ($f = 12\text{GHz}$)
- High Gain : $Ga = 11\text{dB}$ ($f = 12\text{GHz}$)

MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

| CHARACTERISTIC | SYMBOL | RATING | UNIT |
|---------------------------|-----------|---------|------|
| Gate-Drain Voltage | V_{GDO} | -3 | V |
| Gate-Source Voltage | V_{GSO} | -3 | V |
| Drain Current | I_D | 120 | mA |
| Power Dissipation | P_D | 150 | mW |
| Channel Temperature | T_{ch} | 125 | °C |
| Storage Temperature Range | T_{stg} | -55~125 | °C |

Marking



Weight : 0.016g (Typ.)

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

| CHARACTERISTIC | SYMBOL | TEST CONDITION | MIN. | TYP. | MAX. | UNIT |
|-----------------------------|----------------------|---|------|------|------|---------------|
| Gate Leakage Current | I_{GSS} | $V_{DS} = 0, V_{GS} = -2\text{V}$ | — | — | -20 | μA |
| Drain Current | I_{DSS} | $V_{DS} = 1\text{V}, V_{GS} = 0$ | 25 | 70 | 120 | mA |
| Gate-Source Cut-off Voltage | $V_{GS(\text{OFF})}$ | $V_{DS} = 1\text{V}, I_D = 100\mu\text{A}$ | -0.2 | -0.8 | -2 | V |
| Forward Transfer Admittance | $ Y_{fs} $ | $V_{DS} = 1\text{V}, I_D = 20\text{mA}, f = 1\text{kHz}$ | — | 100 | — | mS |
| Noise Figure | NF | $V_{DS} = 1\text{V}, I_D = 20\text{mA}, f = 12\text{GHz}$ | — | 0.45 | 0.6 | dB |
| Associated Gain | Ga | $V_{DS} = 1\text{V}, I_D = 20\text{mA}, f = 12\text{GHz}$ | 10 | 11 | — | dB |

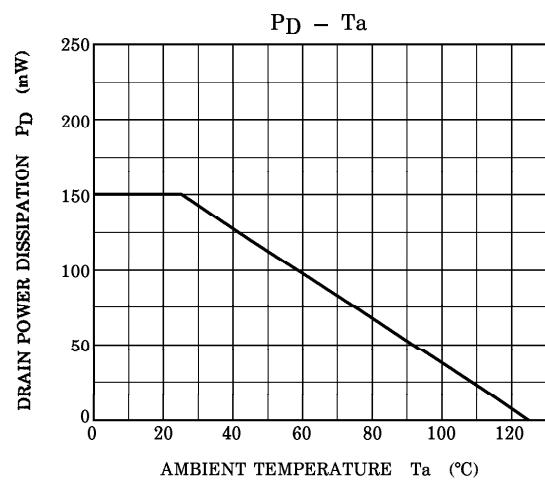
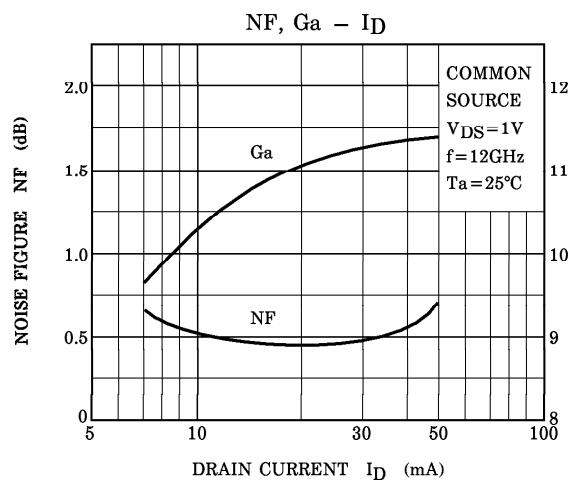
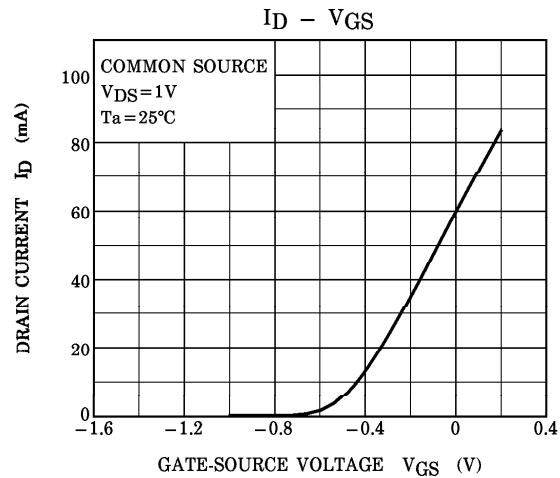
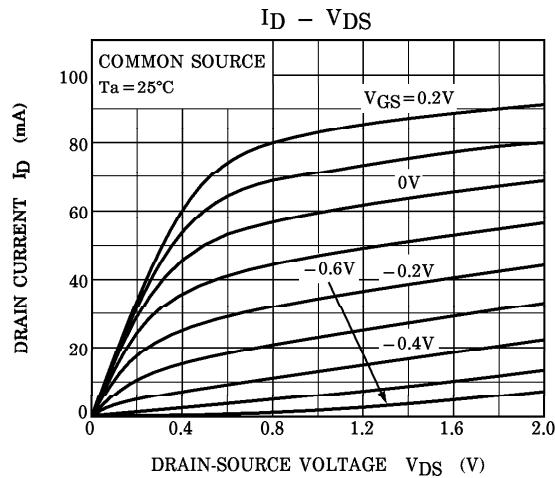
CAUTION

GaAs (Gallium Arsenide) is used in this product. The dust or vapor can be dangerous to humans. 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 device electrostatic sensitivity. Please handle with caution.

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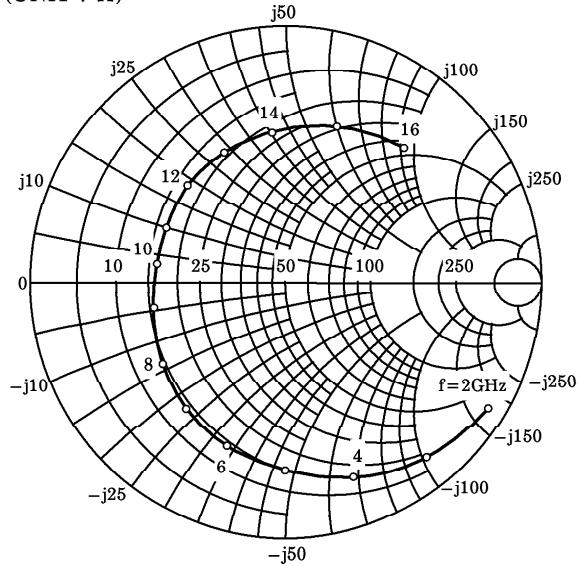
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- Gallium arsenide (GaAs) is a substance used in the products described in this document. GaAs dust and fumes are toxic. Do not break, cut or pulverize the product, or use chemicals to dissolve them. When disposing of the products, follow the appropriate regulations. Do not dispose of the products with other industrial waste or with domestic garbage.
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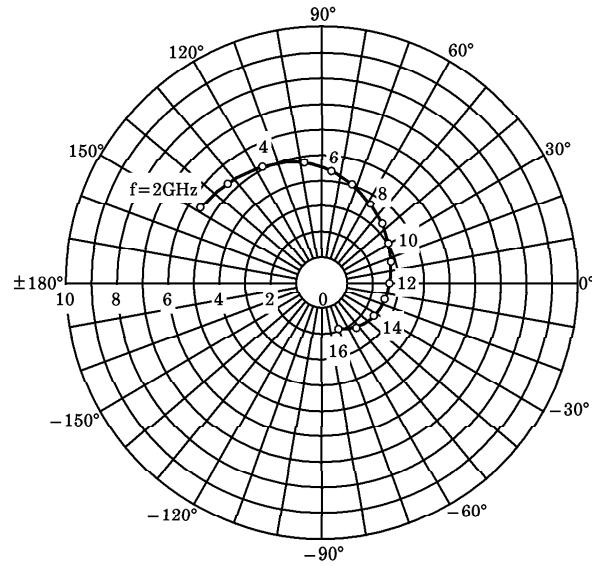
S-PARAMETER
 COMMON SOURCE
 (V_{DS}=1V, I_D=20mA, T_a=25°C, Z₀=50Ω)

| FREQ. (MHz) | S ₁₁ | | S ₂₁ | | S ₁₂ | | S ₂₂ | |
|----------------|-----------------|------|-----------------|-----|-----------------|-----|-----------------|------|
| | MAG | ANG | MAG | ANG | MAG | ANG | MAG | ANG |
| 2000 | 0.935 | -32 | 5.581 | 148 | 0.037 | 77 | 0.143 | -11 |
| 3000 | 0.871 | -51 | 5.352 | 133 | 0.054 | 71 | 0.117 | -26 |
| 4000 | 0.803 | -70 | 5.050 | 117 | 0.070 | 61 | 0.084 | -40 |
| 5000 | 0.734 | -90 | 4.741 | 98 | 0.087 | 51 | 0.042 | -81 |
| 6000 | 0.670 | -110 | 4.377 | 84 | 0.098 | 43 | 0.047 | -166 |
| 7000 | 0.622 | -128 | 3.969 | 71 | 0.108 | 34 | 0.071 | 166 |
| 8000 | 0.570 | -147 | 3.637 | 57 | 0.117 | 25 | 0.086 | 139 |
| 9000 | 0.525 | -168 | 3.310 | 42 | 0.120 | 13 | 0.133 | 114 |
| 10000 | 0.518 | 172 | 3.062 | 29 | 0.128 | 5 | 0.177 | 104 |
| 11000 | 0.526 | 156 | 2.874 | 17 | 0.136 | -4 | 0.206 | 95 |
| 12000 | 0.541 | 135 | 2.696 | -1 | 0.143 | -18 | 0.245 | 81 |
| 13000 | 0.564 | 115 | 2.523 | -15 | 0.146 | -29 | 0.287 | 69 |
| 14000 | 0.588 | 95 | 2.401 | -32 | 0.150 | -42 | 0.318 | 57 |
| 15000 | 0.637 | 71 | 2.200 | -52 | 0.156 | -59 | 0.384 | 41 |
| 16000 | 0.688 | 48 | 1.887 | -70 | 0.146 | -74 | 0.469 | 25 |

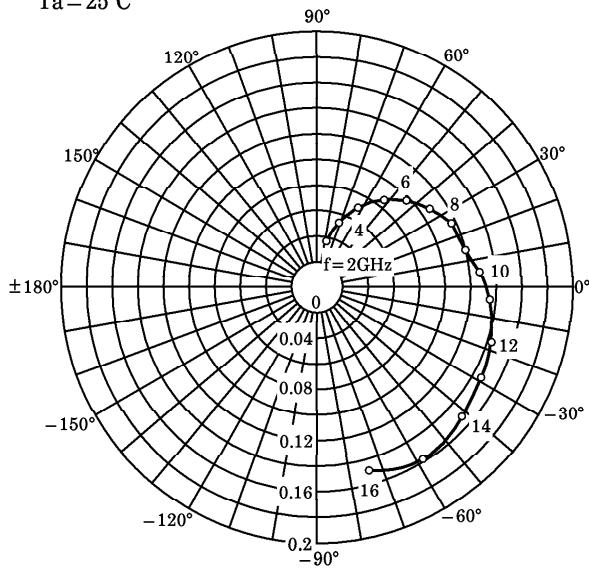
S₁₁
COMMON SOURCE
V_{DS}=1V
I_D=20mA
T_a=25°C
(UNIT : Ω)



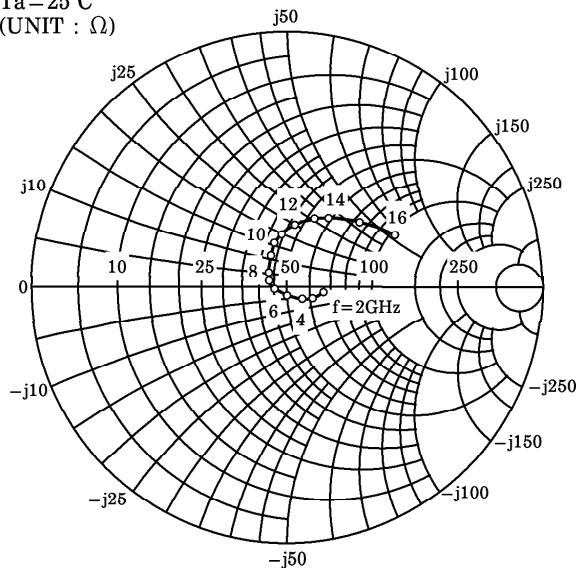
S₂₁
COMMON SOURCE
V_{DS}=1V
I_D=20mA
T_a=25°C



S₁₂
COMMON SOURCE
V_{DS}=1V
I_D=20mA
T_a=25°C



S₂₂
COMMON SOURCE
V_{DS}=1V
I_D=20mA
T_a=25°C
(UNIT : Ω)

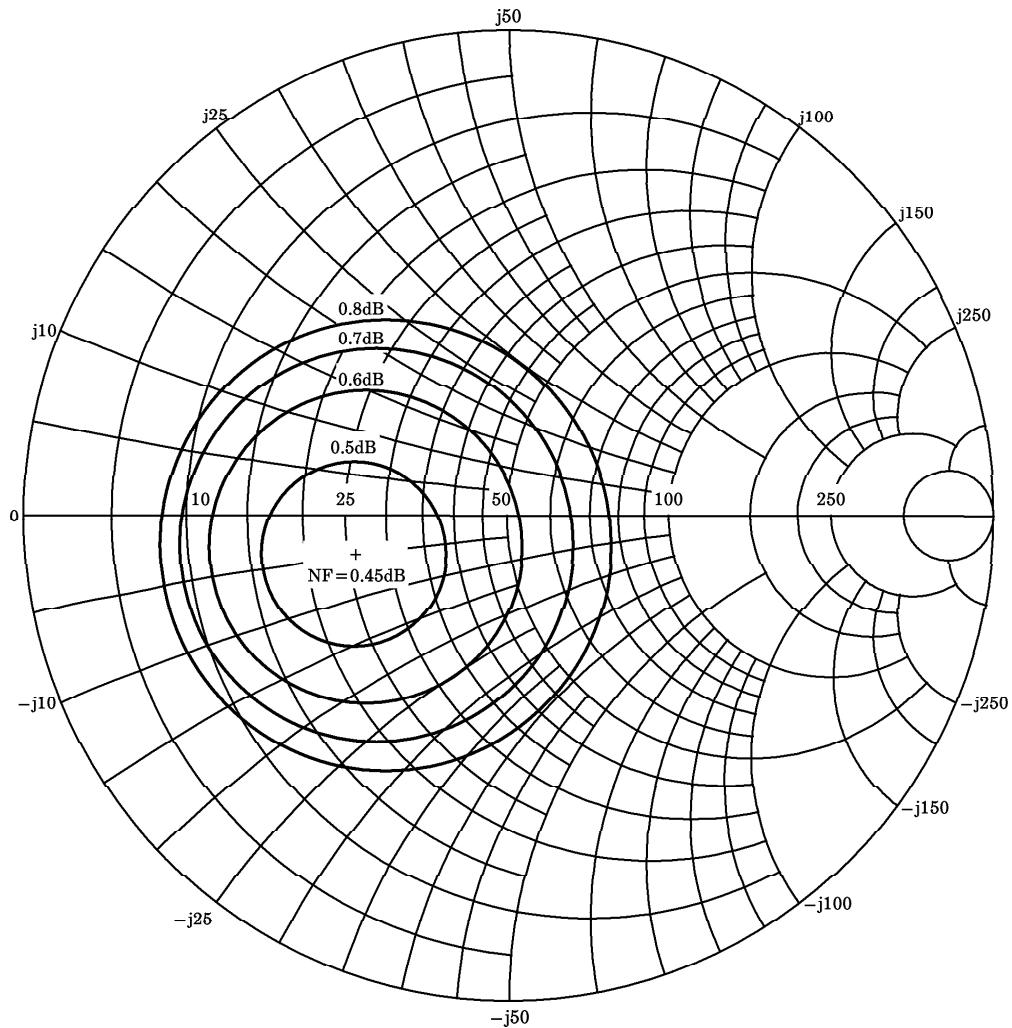


CONSTANT NOISE FIGURE

NF min=0.45dB, $\Gamma_{opt}=0.33 \angle -167^\circ$, $R_n=1.7\Omega$

@ $V_{DS}=1V$, $I_D=20mA$, $f=12GHz$

$Z_0=50\Omega$, $T_a=25^\circ C$



Recommended Methods of Mounting for This Device

| Mounting method | | | | |
|-----------------|---------------------|--------------------|----------------------|----------------|
| Solder flow | Nearinfrared reflow | Farinfrared reflow | VPS & hot air reflow | Soldering iron |
| × | ○ | ◎ | ○ | ○ |

◎ : Applicable

○ : Applicable only once

× : Not applicable; other methods are recommended.

Note 1 : For either method of mounting, the above table shows whether applicable or not under Toshiba's recommended mounting conditions.

Note 2 : When mounted a number of times, those marked by ○ can only be used. In this case, mounting is allowed up to three times, with the interval from the first to the third mounting completed within 24 hours.