

VHF車載無線機用パワートランジスタ

NPN エピタキシャル形シリコントランジスタ / NPN SILICON EPITAXIAL TRANSISTOR

VHF帯電力増幅用 / VHF Power Amplifier

通信工業用 / Industrial Use

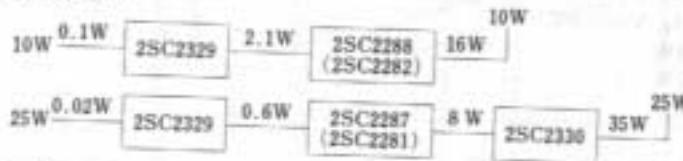
特 徴 / FEATURES

- ・エミッタ安定化抵抗を内蔵。
- ・VSWR ∞ に耐える。
- ・3種類のパッケージが用意されており、用途または応用に対し最適なものが選択できます。

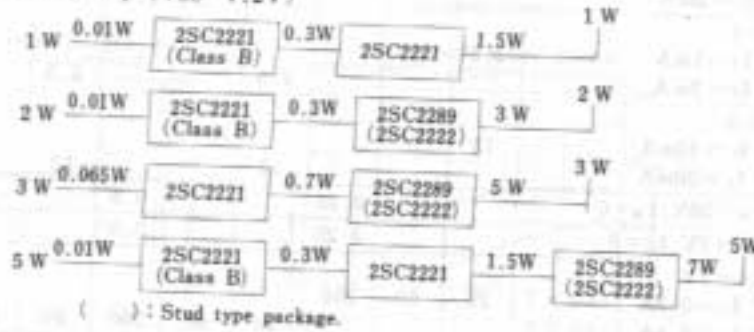
| PACKAGE | 品 名 | |
|-----------|---------|---------|
| TO-39 | 2SC2221 | 2SC2329 |
| # 204 | 2SC2281 | 2SC2222 |
| # 757 | 2SC2282 | |
| # 789 A * | 2SC2287 | 2SC2288 |
| # 789 B | 2SC2289 | |
| # 783 | 2SC2330 | |

* # 789AパッケージはK規格
789BパッケージはM規格

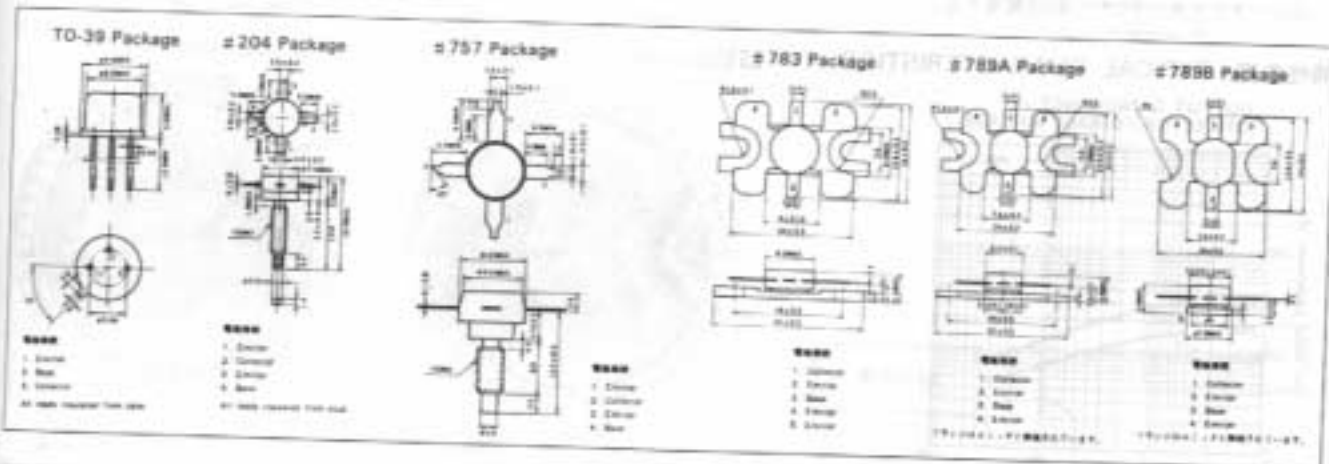
150MHz Band for Mobile



150MHz Band for Handy (V_{CC}=7.2V)



外形図 / PACKAGE DIMENSIONS (Unit:mm)



VHF車載無線機用パワートランジスタ

絶対最大定格 / ABSOLUTE MAXIMUM RATINGS (T_a = 25°C)

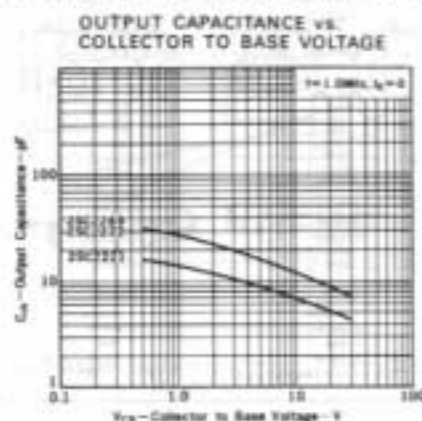
| 項目 | 略号 | 2SC2221 | 2SC2289 | 2SC2222 | 単位 |
|--------------|--|------------|------------|------------|------|
| コレクタ・ベース間電圧 | V _{CB0} | 25 | 25 | 25 | V |
| エミッタ・ベース間電圧 | V _{EB0} | 2.5 | 2.5 | 2.5 | V |
| コレクタ・エミッタ間電圧 | V _{CE0} | 12 | 12 | 12 | V |
| コレクタ電流 | I _c | 0.75 | 1.5 | 1.5 | A |
| 熱抵抗 | R _{θ(j-c)} | 20 | 8.8 | 8.8 | °C/W |
| 全損失 | P _T (T _a = 25°C) | 7.5 | 17 | 17 | W |
| ジャンクション温度 | T _j | 175 | 175 | 175 | °C |
| 保存温度 | T _{stg} | -65 ~ +175 | -65 ~ +150 | -65 ~ +175 | °C |

電気的特性 / ELECTRICAL CHARACTERISTICS (T_a = 25°C)

| 項目 | 略号 | 条 件 | 2SC2221 | | | 2SC2289 | | | 2SC2222 | | | 単位 |
|--------------------|---|--|---------|------|------|---------|------|------|---------|------|------|-----|
| | | | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | |
| 出力電力 | P _{out} | V _{CC} = 7.2V, f = 175MHz P _{in} = 23dBm P _{in} = 28.5dBm | 32 | 33 | | | | | | | | dBm |
| | | | | | | 37 | 38.5 | | 37 | 38 | | |
| コレクタ効率 | η _c | V _{CC} = 7.2V, f = 175MHz P _{in} = 23dBm P _{in} = 28.5dBm | 60 | 70 | | | | | | | | % |
| | | | | | | 60 | 70 | | 60 | 70 | | |
| VSWR | f = 175MHz, V _{CC} = 9V P ₀ = 3W P ₀ = 7W P ₀ = 6W | ∞ | | | | | | | | | | |
| | | | | | | | | | | | | |
| コレクタ・ベース間 降伏電圧 | BV _{CB0} | I _K = 0 I _c = 1mA I _c = 2mA | 25 | | | | | | | | | V |
| | | | | | | 25 | | 25 | | | | |
| エミッタ・ベース間 降伏電圧 | BV _{EB0} | I _c = 0 I _E = 1mA I _E = 2mA | 2.5 | | | | | | | | | V |
| | | | | | | 2.5 | | 2.5 | | | | |
| コレクタ・エミッタ間 維持電圧 | LV _{CE0} | I _B = 0 I _c = 10mA I _c = 20mA | 12 | | | | | | | | | V |
| | | | | | | 12 | | 12 | | | | |
| コレクタしゃ断電流 | I _{CB0} | V _{CB} = 20V, I _E = 0 | | | 0.25 | | | 0.5 | | 0.5 | mA | |
| エミッタしゃ断電流 | I _{EB0} | V _{EB} = 2V, I _c = 0 | | | 0.25 | | | 0.5 | | 0.5 | mA | |
| 直流電流増幅率 | h _{FE} | V _{CE} = 7V I _c = 0.2A (パルス) I _c = 0.4A (パルス) | 20 | 60 | 200 | | | | | | | |
| コレクタ容量 | C _{ob} | V _{CB} = 10V, I _E = 0 f = 1.0MHz | | 7 | 10 | | | 12 | 18 | 12 | 18 | pF |

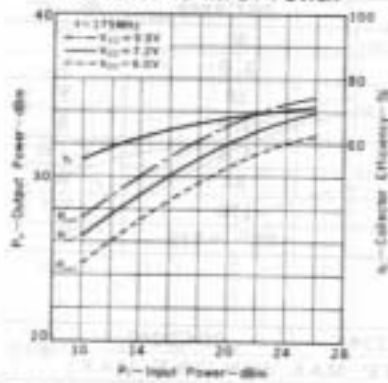
・エミッタとスタッド(ケース)は接地する。

特性曲線 / TYPICAL CHARACTERISTICS (T_a = 25°C)

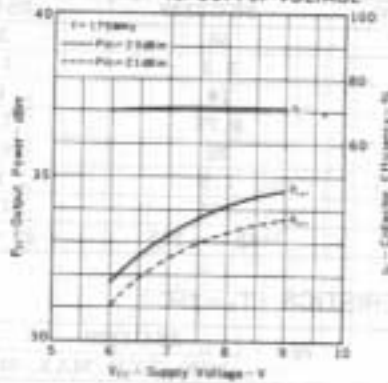


2SC2221

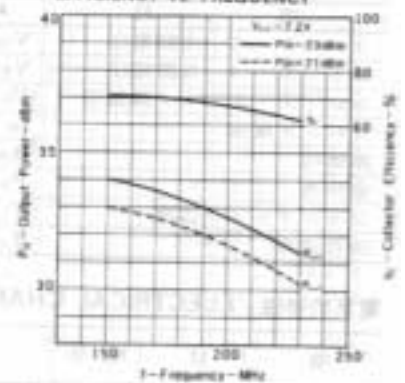
OUTPUT POWER & COLLECTOR EFFICIENCY vs. INPUT POWER



OUTPUT POWER & COLLECTOR EFFICIENCY vs. SUPPLY VOLTAGE

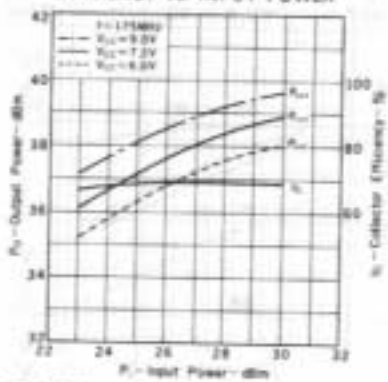


OUTPUT POWER & COLLECTOR EFFICIENCY vs. FREQUENCY

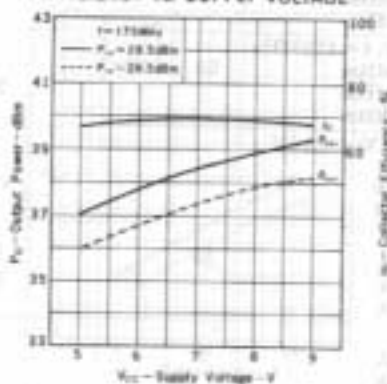


2SC2289

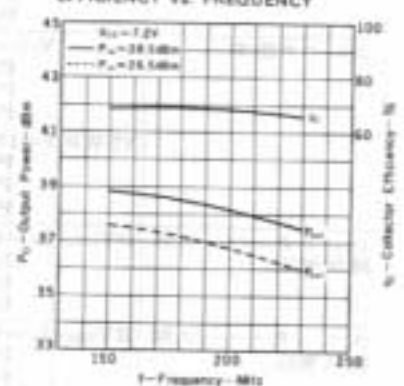
OUTPUT POWER & COLLECTOR EFFICIENCY vs. INPUT POWER



OUTPUT POWER & COLLECTOR EFFICIENCY vs. SUPPLY VOLTAGE

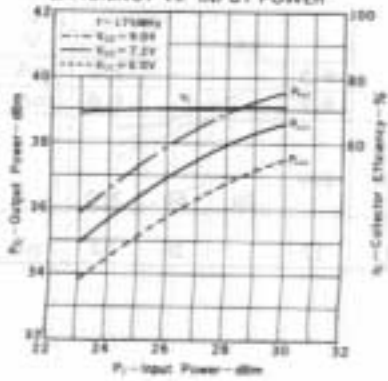


OUTPUT POWER & COLLECTOR EFFICIENCY vs. FREQUENCY

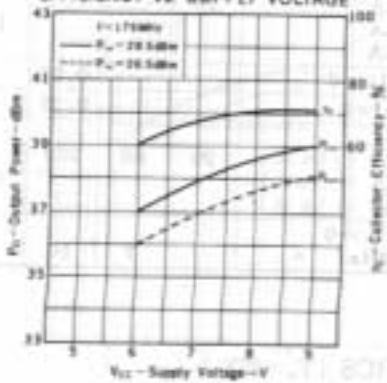


2SC2222

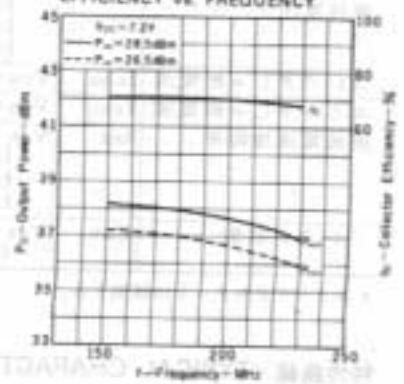
OUTPUT POWER & COLLECTOR EFFICIENCY vs. INPUT POWER



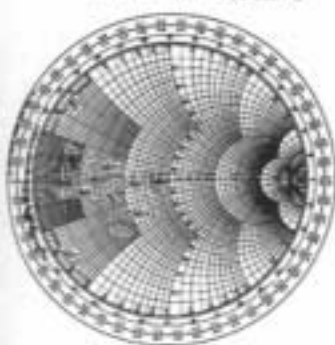
OUTPUT POWER & COLLECTOR EFFICIENCY vs. SUPPLY VOLTAGE



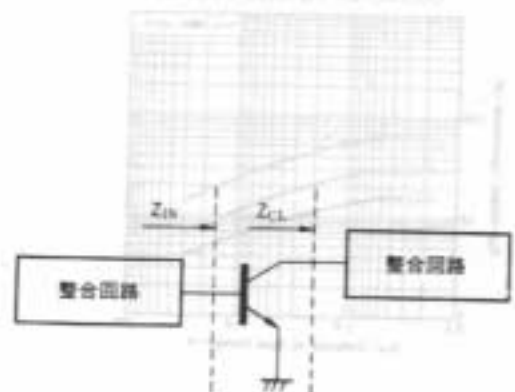
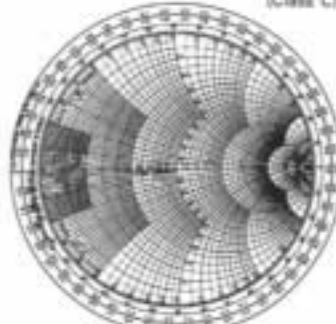
OUTPUT POWER & COLLECTOR EFFICIENCY vs. FREQUENCY



S-PARAMETER (Class A)



INPUT AND OUTPUT IMPEDANCE (Class C)



VHF車載無線機用パワートランジスタ

絶対最大定格 / ABSOLUTE MAXIMUM RATINGS (T_a = 25°C)

| 項目 | 略号 | 2SC2329 | 2SC2281 | 2SC2282 | 単位 |
|--------------|--|------------|------------|------------|------|
| コレクタ・ベース間電圧 | V _{CB0} | 38 | 38 | 38 | V |
| エミッタ・ベース間電圧 | V _{EB0} | 3.0 | 3.0 | 3.0 | V |
| コレクタ・エミッタ間電圧 | V _{CE0} | 18 | 18 | 18 | V |
| コレクタ電流 | I _C | 0.75 | 1.5 | 3.0 | A |
| 熱抵抗 | R _{th(j-c)} | 20 | 8.8 | 4.4 | °C/W |
| 全損失 | P _T (T _a = 25°C) | 7.5 | 17 | 34 | W |
| ジャンクション温度 | T _j | 175 | 175 | 175 | °C |
| 保存温度 | T _{stg} | -65 ~ +175 | -65 ~ +175 | -65 ~ +175 | °C |

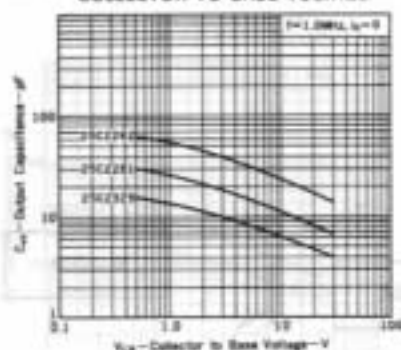
電気的特性 / ELECTRICAL CHARACTERISTICS (T_a = 25°C)

| 項目 | 略号 | 条件 | 2SC2329 | | | 2SC2281 | | | 2SC2282 | | | 単位 |
|--------------------|-------------------|--|---------|------|------|---------|------|------|---------|------|------|-------------------|
| | | | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | |
| 出力電力 | P _{out} | V _{CC} = 13.5V, f = 175MHz P _{in} = 20dBm P _{in} = 26dBm P _{in} = 34dBm | 33 | 34.5 | | 38.5 | 39.2 | | 41.8 | 43 | | dBm dBm dBm |
| コレクタ効率 | η _c | V _{CC} = 13.5V, f = 175MHz P _{in} = 20dBm P _{in} = 26dBm P _{in} = 34dBm | 55 | 70 | | 55 | 65 | | 55 | 65 | | % % % |
| | | VSWR f = 175MHz, V _{CC} = 16V P _O = 4W P _O = 10W P _O = 20W | ∞ | | | ∞ | | | ∞ | | | |
| コレクタ・ベース間 降伏電圧 | BV _{CB0} | I _E = 0 I _C = 1mA I _C = 2mA I _C = 4mA | 38 | | | 38 | | | 38 | | | V V V |
| エミッタ・ベース間 降伏電圧 | BV _{EB0} | I _E = 0 I _E = 1mA I _E = 2mA I _E = 4mA | 3 | | | 3 | | | 3 | | | V V V |
| コレクタ・エミッタ間 維持電圧 | LV _{CE0} | I _B = 0 I _C = 10mA I _C = 20mA I _C = 40mA | 18 | | | 18 | | | 18 | | | V V V |
| コレクタしゃ断電流 | I _{CB0} | V _{CB} = 30V, I _E = 0 | | | 0.25 | | | 0.5 | | | 1.0 | mA |
| エミッタしゃ断電流 | I _{EB0} | V _{EB} = 2V, I _C = 0 | | | 0.25 | | | 0.5 | | | 1.0 | mA |
| 直流電流増幅率 | h _{FE} | V _{CE} = 10V I _C = 0.2A (ノイズ) I _C = 0.4A (ノイズ) I _C = 0.8A (ノイズ) | 20 | 60 | 200 | 20 | 60 | 200 | 20 | 60 | 200 | |
| コレクタ容量 | C _{ob} | V _{CB} = 10V, I _E = 0 f = 1.0MHz | 7 | 10 | | 12 | 17 | | 25 | 33 | | pF |

・エミッタとスタッドは接地する。

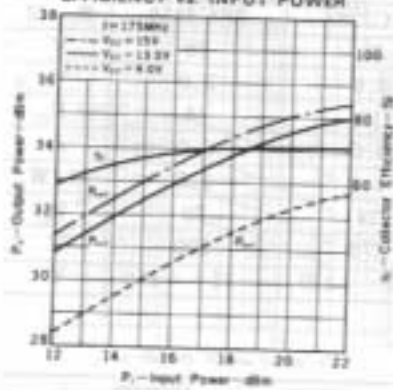
特性曲線 / TYPICAL CHARACTERISTICS (T_a = 25°C)

OUTPUT CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE

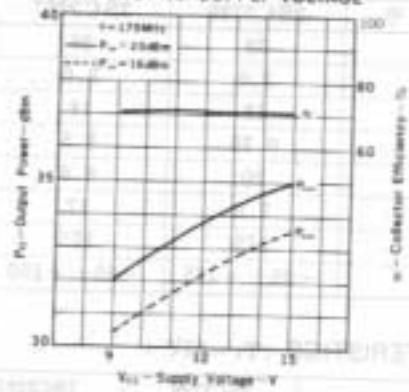


2SC2329

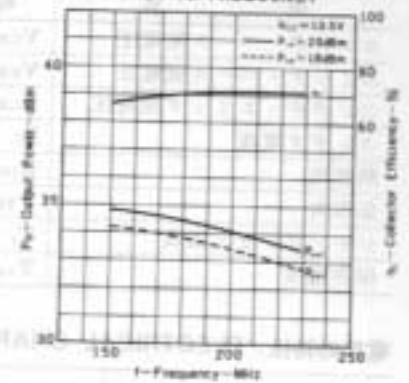
OUTPUT POWER & COLLECTOR EFFICIENCY vs. INPUT POWER



OUTPUT POWER & COLLECTOR EFFICIENCY vs. SUPPLY VOLTAGE

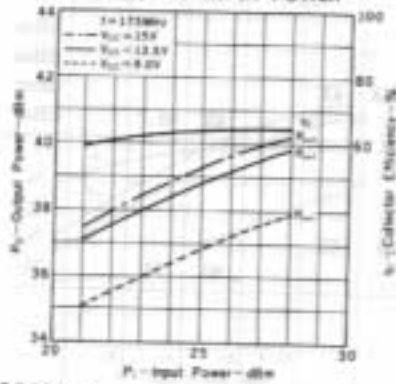


OUTPUT POWER & COLLECTOR EFFICIENCY vs. FREQUENCY

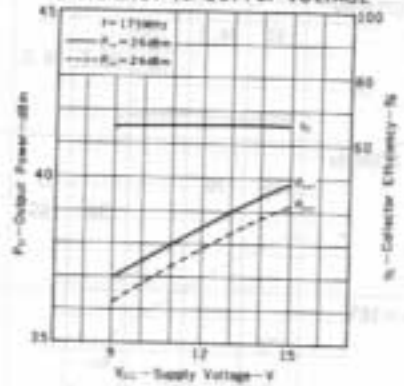


2SC2281

OUTPUT POWER & COLLECTOR EFFICIENCY vs. INPUT POWER

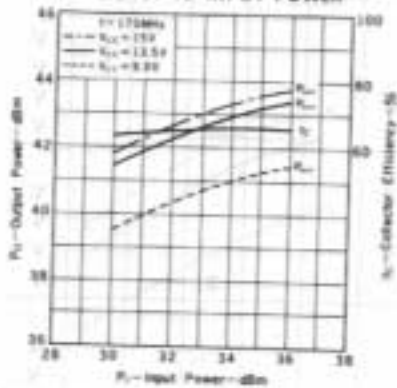


OUTPUT POWER & COLLECTOR EFFICIENCY vs. SUPPLY VOLTAGE

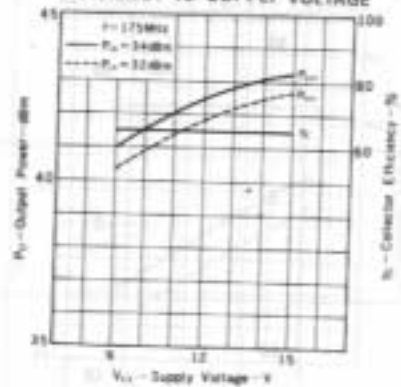


2SC2282

OUTPUT POWER & COLLECTOR EFFICIENCY vs. INPUT POWER



OUTPUT POWER & COLLECTOR EFFICIENCY vs. SUPPLY VOLTAGE



VHF車載無線機用パワートランジスタ

6151-001

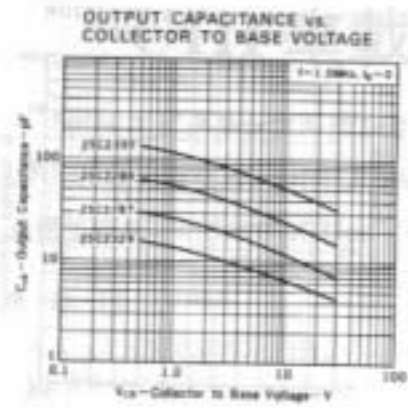
絶対最大定格 / ABSOLUTE MAXIMUM RATINGS (T_a = 25°C)

| 項目 | 略号 | 2SC2329 | 2SC2287 | 2SC2288 | 2SC2330 | 単位 |
|--------------|--|------------|------------|------------|------------|------|
| コレクタ・ベース間電圧 | V _{CB0} | 38 | 38 | 38 | 38 | V |
| エミッタ・ベース間電圧 | V _{EB0} | 3.0 | 3.0 | 3.0 | 3.0 | V |
| コレクタ・エミッタ間電圧 | V _{CE0} | 18 | 18 | 18 | 18 | V |
| コレクタ電流 | I _C | 0.75 | 1.5 | 3.0 | 6.0 | A |
| 熱抵抗 | R _{th(j-c)} | 20 | 8.8 | 4.4 | 2.5 | °C/W |
| 全損失 | P _T (T _c = 25°C) | 7.5 | 17 | 34 | 70 | W |
| ジャンクション温度 | T _j | 175 | 175 | 175 | 200 | °C |
| 保存温度 | T _{stg} | -65 - +175 | -65 - +150 | -65 - +150 | -65 - +150 | °C |

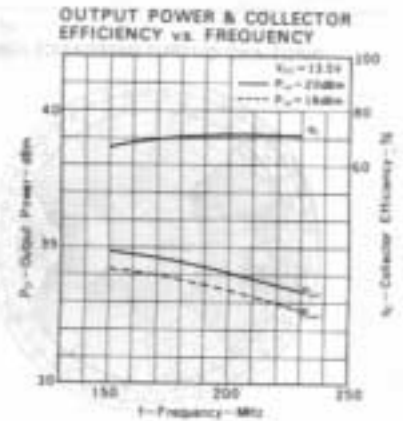
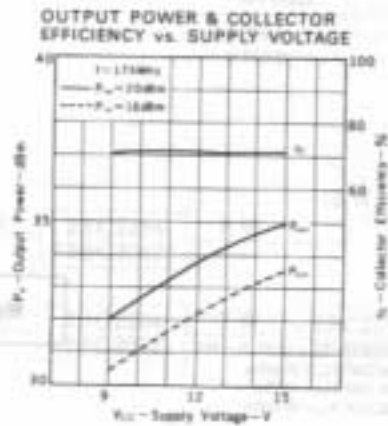
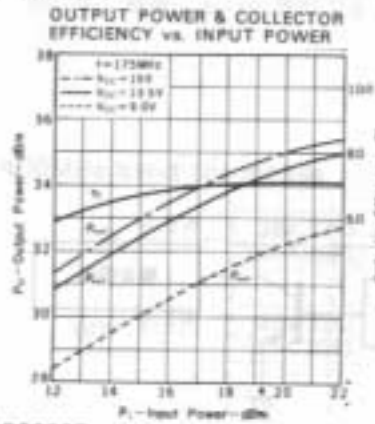
電気的特性 / ELECTRICAL CHARACTERISTICS (T_a = 25°C)

| 項目 | 略号 | 条件 | 2SC2329 | | | 2SC2287 | | | 2SC2288 | | | 2SC2330 | | | 単位 | | |
|----------------|-----------------------------------|---|------------------|--|------|---------|------|------|---------|------|------|---------|------|------|-----|----|--|
| | | | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. | | | |
| 出力電力 | P _{out} | V _{CC} = 13.5V, f = 175MHz | | | | | | | | | | | | | | | |
| | | P _{in} = 20dBm | 33 | 34.5 | | 38.5 | 39.5 | | | | | | | | dBm | | |
| | | P _{in} = 26dBm | | | | | | | | | | | | | dBm | | |
| | | P _{in} = 34dBm | | | | | | | 41.8 | 43 | | | | | dBm | | |
| コレクタ効率 | η _c | V _{CC} = 13.5V, f = 175MHz | | | | | | | | | | | | | | | |
| | | P _{in} = 20dBm | 55 | 70 | | 50 | 65 | | | | | | | | % | | |
| | | P _{in} = 26dBm | | | | | | | 50 | 65 | | | | | % | | |
| | | P _{in} = 34dBm | | | | | | | | | 60 | 75 | | | % | | |
| VSWR | f = 175MHz, V _{CC} = 16V | P ₀ = 4W | | | | | | | | | | | | | | | |
| | | P ₀ = 10W | | | | | | | | | | | | | | | |
| | | P ₀ = 20W | | | | | | | | | | | | | | | |
| | | P ₀ = 35W | | | | | | | | | | | | | | | |
| コレクタ・ベース間降伏電圧 | BV _{CB0} | I _B = 0 | | | | | | | | | | | | | | | |
| | | I _C = 1mA | 38 | | | 38 | | | 38 | | | | | | V | | |
| | | I _C = 2mA | | | | | | | | | | | | | V | | |
| | | I _C = 4mA | | | | | | | | | | | | | V | | |
| エミッタ・ベース間降伏電圧 | BV _{EB0} | I _C = 0 | | | | | | | | | | | | | | | |
| | | I _B = 1mA | 3 | | | 3 | | | 3 | | | | | | V | | |
| | | I _B = 2mA | | | | | | | | | | | | | V | | |
| | | I _B = 4mA | | | | | | | | | | | | | V | | |
| コレクタ・エミッタ間維持電圧 | LV _{CE0} | I _B = 0 | | | | | | | | | | | | | | | |
| | | I _C = 10mA | 18 | | | 18 | | | 18 | | | | | | V | | |
| | | I _C = 20mA | | | | | | | | | | | | | V | | |
| | | I _C = 40mA | | | | | | | | | | | | | V | | |
| コレクタシャ断電流 | I _{CS0} | V _{CB} = 30V, I _B = 0 | | | 0.25 | | 0.5 | | 1.0 | | 2.0 | | 2.0 | | mA | | |
| | | エミッタシャ断電流 | I _{ES0} | V _{EB} = 2V, I _C = 0 | | | 0.25 | | 0.5 | | 1.0 | | 2.0 | | 2.0 | mA | |
| | | | | V _{CE} = 10V | | | | | | | | | | | | | |
| | | | | I _C = 0.2A (パルス) | 20 | 60 | 200 | | | | | | | | | | |
| 直流電流増幅率 | h _{FE} | I _C = 0.4A (パルス) | | | | 20 | 60 | 200 | | | | | | | | | |
| | | I _C = 0.8A (パルス) | | | | | | | 20 | 60 | 200 | | | | | | |
| | | I _C = 1.0A (パルス) | | | | | | | | | | 20 | 60 | 200 | | | |
| | | V _{CE} = 10V, I _B = 0 | | | | | | | | | | | | | | | |
| コレクタ容量 | C _{ob} | f = 1.0MHz * | | | 7 | 10 | | 12 | 17 | | 25 | 33 | | 55 | 65 | pF | |

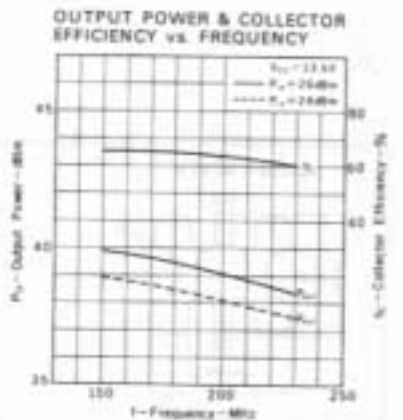
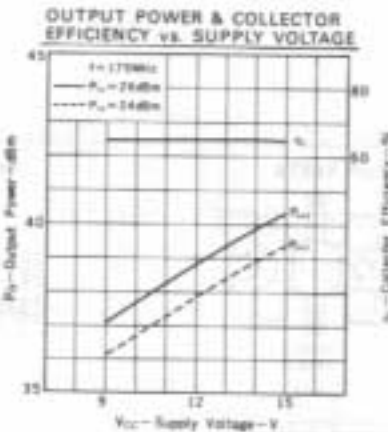
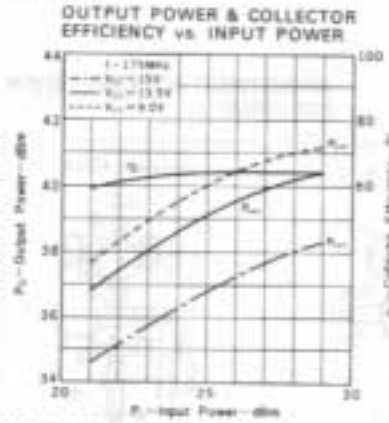
* エミッタとケースは接地する。



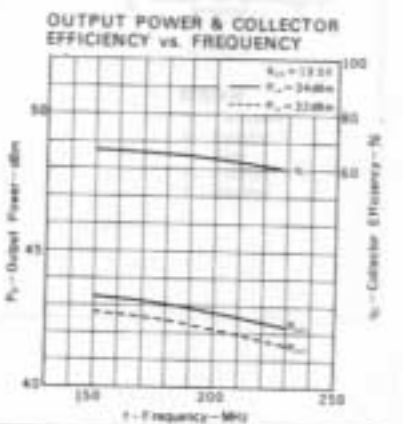
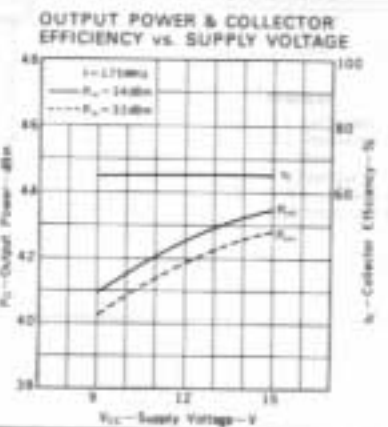
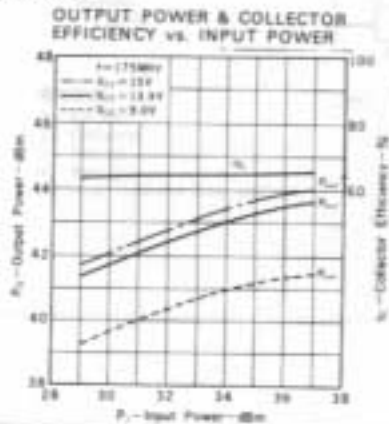
2SC2329



2SC2287



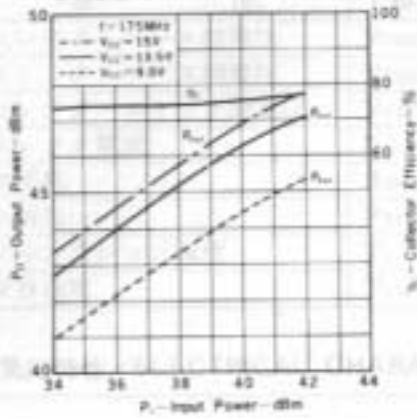
2SC2288



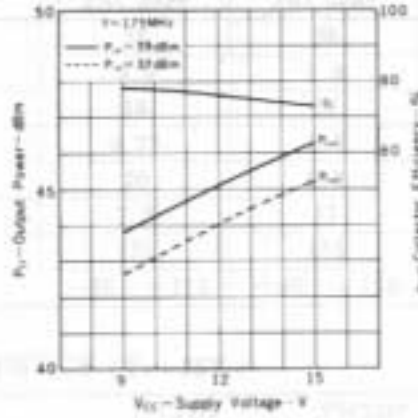
VHF車載無線機用パワートランジスタ

2SC2330

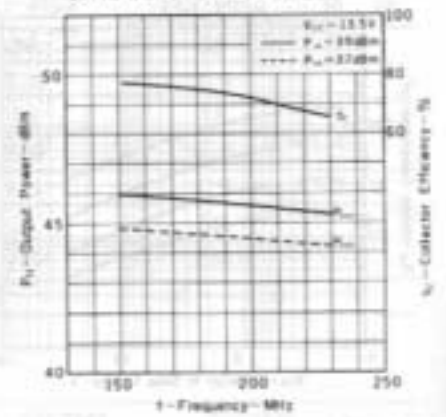
OUTPUT POWER & COLLECTOR EFFICIENCY vs. INPUT POWER



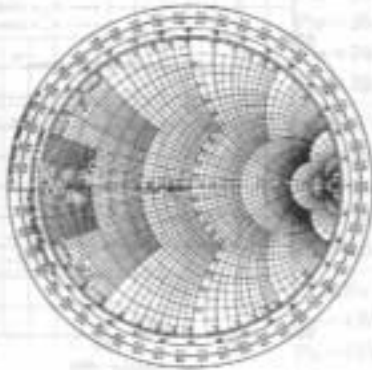
OUTPUT POWER & COLLECTOR EFFICIENCY vs. SUPPLY VOLTAGE



OUTPUT POWER & COLLECTOR EFFICIENCY vs. FREQUENCY



INPUT AND OUTPUT IMPEDANCE (Class C)



f=175MHz $V_{CC}=13.5V$, $Z_i=30\Omega$
 ● 2SC2330 $P_{out}=39.5dBm$
 ○ 2SC2330 $P_{out}=37dBm$
 △ 2SC2330 $P_{out}=35.5dBm$

