



## SD1433

### RF POWER BIPOLAR TRANSISTORS UHF MOBILE APPLICATIONS

#### FEATURES SUMMARY

- 470 MHz
- 12.5 VOLTS
- CLASS C
- EFFICIENCY 60%
- COMMON EMITTER
- $P_{OUT} = 10\text{ W MIN. WITH } 8.0\text{ dB GAIN}$

#### DESCRIPTION

The SD1433 is a Class C epitaxial silicon NPN planar transistor designed for driver applications in the 450 - 512 MHz frequency range. This device uses an emitter ballasted geometry specifically designed for optimum stable power gain, maximum efficiency and infinite VSWR.

Figure 1. Package

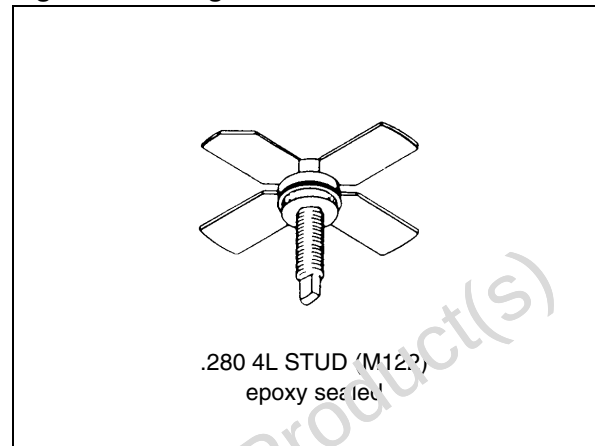


Figure 2. Pin Connection

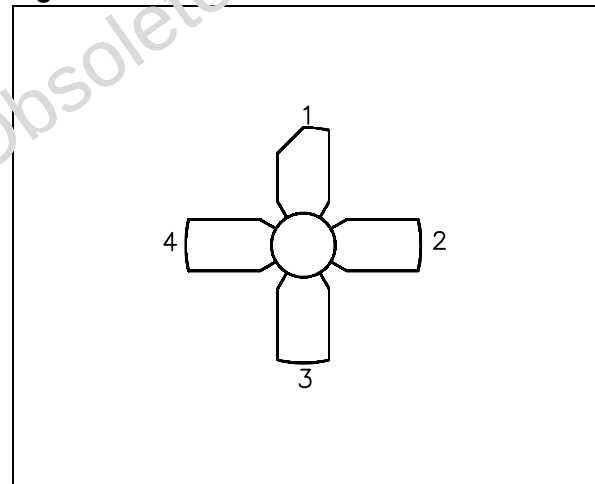


Table 1. Order Codes

| Order Codes | Marking | Package | Packaging        |
|-------------|---------|---------|------------------|
| SD1433      | SD1433  | M122    | BLACK CARDBOARDS |

**Table 2. Absolute Maximum Ratings ( $T_{\text{case}} = 25^{\circ}\text{C}$ )**

| Symbol            | Parameter                 | Value        | Unit               |
|-------------------|---------------------------|--------------|--------------------|
| $V_{\text{CBO}}$  | Collector-Base Voltage    | 36           | V                  |
| $V_{\text{CEO}}$  | Collector-Emitter Voltage | 16           | V                  |
| $V_{\text{CES}}$  | Collector-Emitter Voltage | 36           | V                  |
| $V_{\text{EBO}}$  | Emitter-Base Voltage      | 4.0          | V                  |
| $I_{\text{C}}$    | Device Current            | 2.5          | A                  |
| $P_{\text{DISS}}$ | Power Dissipation         | 58           | W                  |
| $T_{\text{J}}$    | Junction Temperature      | +200         | $^{\circ}\text{C}$ |
| $T_{\text{STG}}$  | Storage Temperature       | - 65 to +150 | $^{\circ}\text{C}$ |

**Table 3. Thermal Data**

| Symbol               | Parameter                        | Value | Unit                 |
|----------------------|----------------------------------|-------|----------------------|
| $R_{\text{TH(j-c)}}$ | Junction-Case Thermal Resistance | 3.0   | $^{\circ}\text{C/W}$ |

**ELECTRICAL SPECIFICATIONS ( $T_{\text{CASE}} = 25^{\circ}\text{C}$ )****Table 4. Static**

| Symbol            | Test Conditions                                                | Value |      |      | Unit |
|-------------------|----------------------------------------------------------------|-------|------|------|------|
|                   |                                                                | Min.  | Typ. | Max. |      |
| $BV_{\text{CES}}$ | $I_{\text{C}} = 25 \text{ mA}$ ; $V_{\text{BE}} = 0 \text{ V}$ | 36    | —    | —    | V    |
| $BV_{\text{CEO}}$ | $I_{\text{C}} = 20 \text{ mA}$ ; $I_{\text{B}} = 0 \text{ mA}$ | 16    | —    | —    | V    |
| $BV_{\text{EBO}}$ | $I_{\text{E}} = 10 \text{ mA}$ ; $I_{\text{C}} = 0 \text{ mA}$ | 4.0   | —    | —    | V    |
| $I_{\text{CES}}$  | $V_{\text{CE}} = 10 \text{ V}$ ; $I_{\text{E}} = 0 \text{ mA}$ | —     | —    | 3    | mA   |
| $I_{\text{CBO}}$  | $V_{\text{CB}} = 15 \text{ V}$ ; $I_{\text{E}} = 0 \text{ mA}$ | —     | —    | 2    | mA   |
| $h_{\text{FE}}$   | $V_{\text{CE}} = 5 \text{ V}$ ; $I_{\text{C}} = 1 \text{ A}$   | 10    | —    | —    | —    |

**Table 5. Dynamic**

| Symbol           | Test Conditions                                                                            | Value |      |      | Unit |
|------------------|--------------------------------------------------------------------------------------------|-------|------|------|------|
|                  |                                                                                            | Min.  | Typ. | Max. |      |
| $P_{\text{OUT}}$ | $f = 470 \text{ MHz}$ ; $P_{\text{IN}} = 2.0 \text{ W}$ ; $V_{\text{CE}} = 12.5 \text{ V}$ | 10    | —    | —    | W    |
| $G_{\text{P}}$   | $f = 470 \text{ MHz}$ ; $P_{\text{OUT}} = 10 \text{ W}$ ; $V_{\text{CE}} = 12.5 \text{ V}$ | 7     | —    | —    | dB   |
| $C_{\text{OB}}$  | $f = 1 \text{ MHz}$ ; $V_{\text{CB}} = 12.5 \text{ V}$                                     | —     | 19   | —    | pF   |

## TYPICAL PERFORMANCE

Figure 3. Power Output vs Power Input

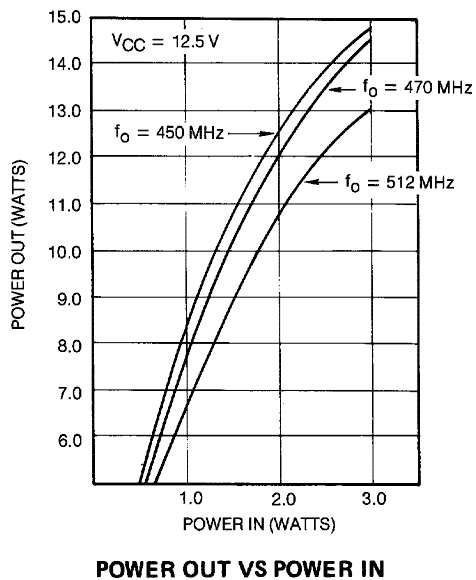


Figure 4. Power Gain &amp; Efficiency vs Power Input

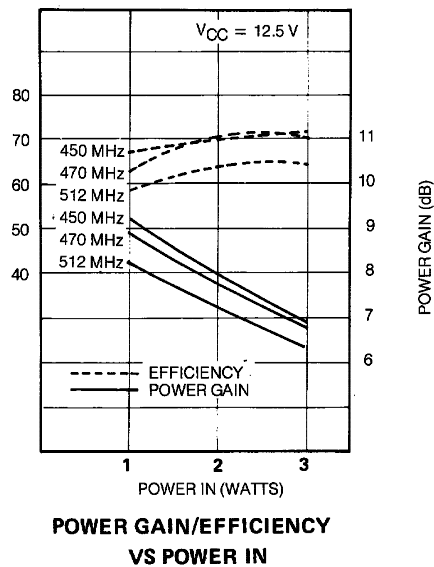
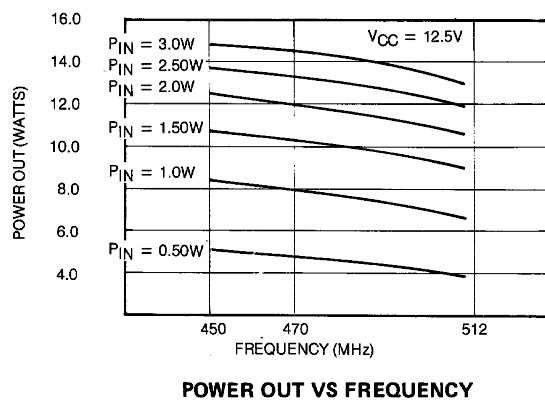
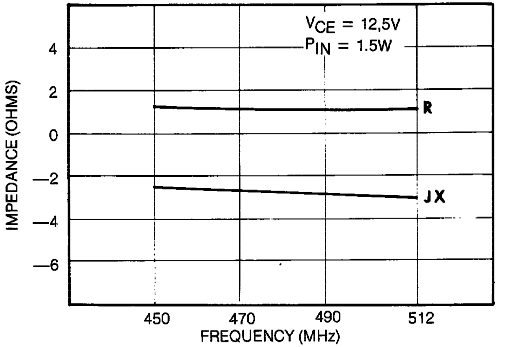


Figure 5. Power Output vs Frequency



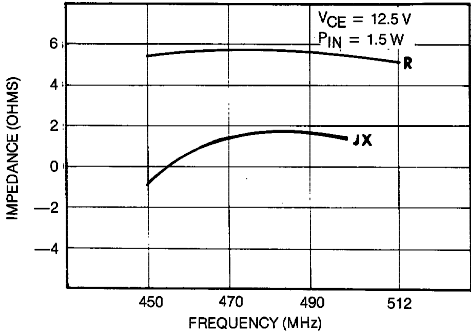
IMPEDANCE DATA

Figure 6. Typical Input Impedance



SERIES SOURCE IMPEDANCE VS FREQUENCY

Figure 7. Typical Collector Load Impedance



SERIES COLLECTOR LOAD IMPEDANCE VS FREQUENCY

Table 6. Impedance Data

| FREQ.   | $Z_{IN} (\Omega)$ | $Z_{CL} (\Omega)$ |
|---------|-------------------|-------------------|
| 470 MHz | $1.5 - j 2.7$     | $5.7 + j 1.5$     |

## TEST CIRCUIT

Figure 8. Test Circuit

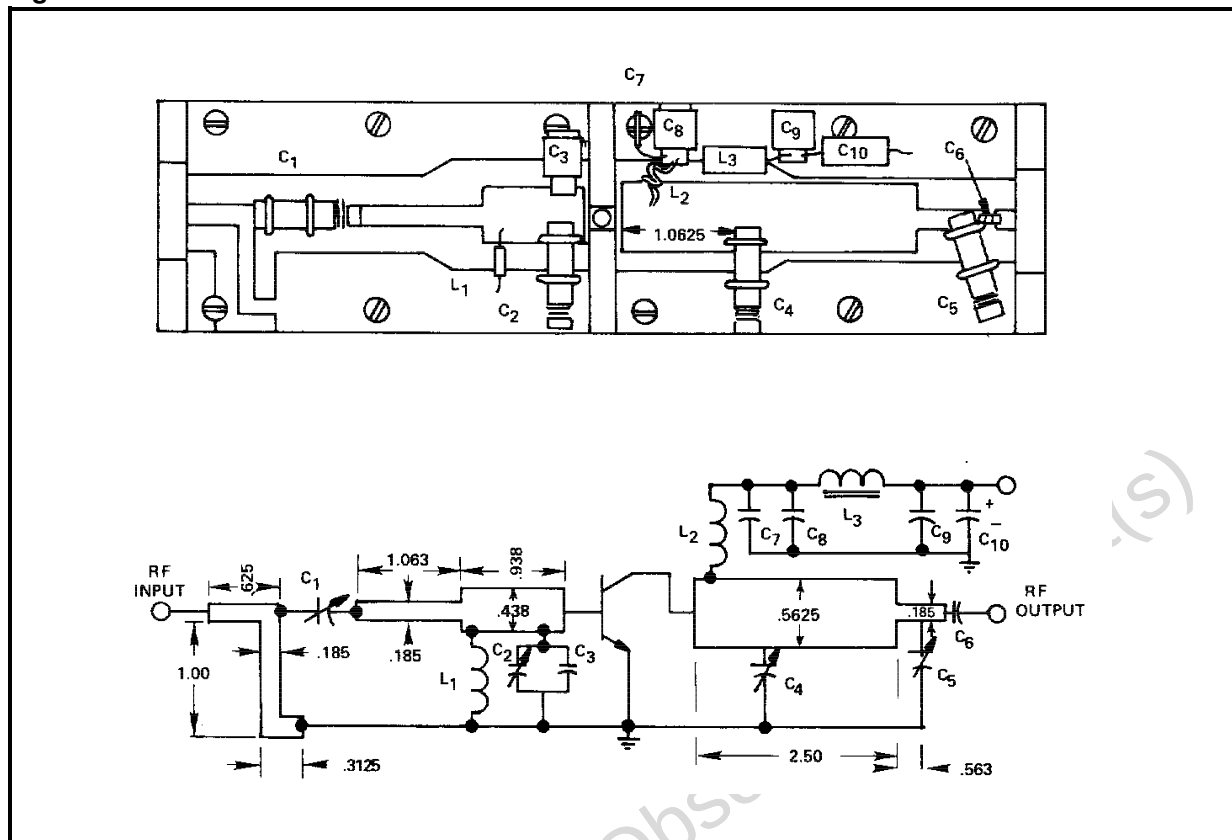


Table 7. Test Circuit

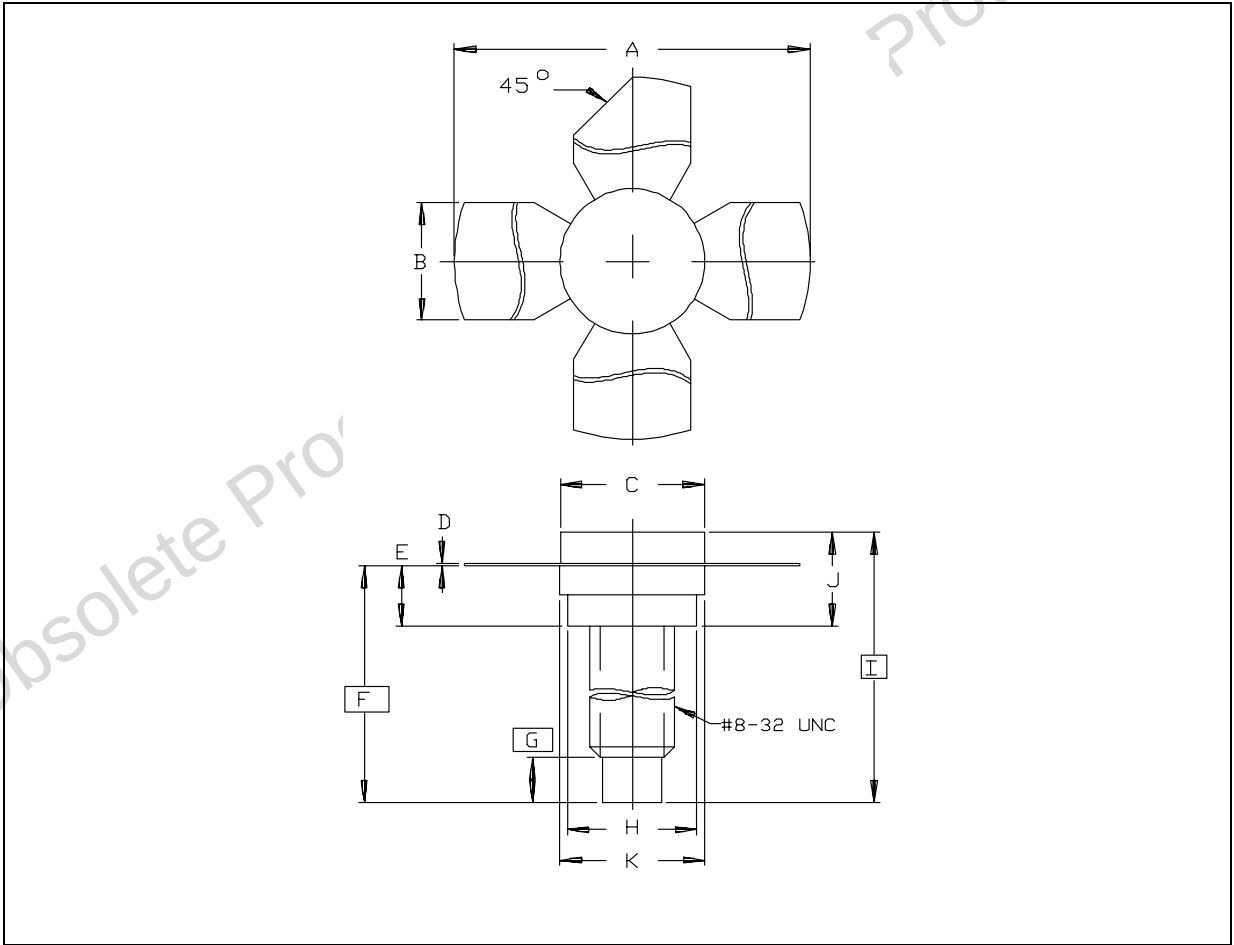
|                 |                                   |
|-----------------|-----------------------------------|
| C1, C2:         | 0.8pF Voltronics                  |
| C3:             | 18pF Chip Capacitor               |
| C4, C5:         | AJ810                             |
| C6:             | 1000pF Chip Capacitor             |
| C7:             | 0.01μF Disc Ceramic               |
| C8, C9:         | 1000pF Unelco                     |
| C10:            | 10μF, 35V Electrolytic            |
| L1:             | 0.47μH Molded Choke               |
| L2:             | 2 Turns, #20 AWG, 1/8" I.D.       |
| L3:             | 2 Turns in Ferroxcube VK200/19-4B |
| Board Material: | 3M-K6098, 1/16" Thick             |

PACKAGE MECHANICAL

Table 8. M122 Mechanical Data

| Symbol | millimeters |       |       | inches |       |       |
|--------|-------------|-------|-------|--------|-------|-------|
|        | Min         | Typ   | Max   | Min    | Typ   | Max   |
| A      | 25.65       |       | 26.80 | 1.010  |       | 1.055 |
| B      | 5.59        |       | 5.84  | 0.220  |       | 0.230 |
| C      | 6.86        |       | 7.24  | 0.270  |       | 0.285 |
| D      | 0.08        |       | 0.18  | 0.003  |       | 0.007 |
| E      | 2.97        |       | 3.48  | 0.117  |       | 0.137 |
| F      |             | 14.53 |       |        | 0.572 |       |
| G      |             | 3.30  |       |        | 0.130 |       |
| H      | 6.22        |       | 6.48  | 0.245  |       | 0.255 |
| I      |             | 16.26 |       |        | 0.640 |       |
| J      | 4.45        |       | 5.51  | 0.175  |       | 0.217 |
| K      | 6.99        |       | 7.24  | 0.275  |       | 0.285 |

Figure 9. M122 Package Dimensions



Note: Drawing is not to scale.

**REVISION HISTORY****Table 9. Revision History**

| Date          | Revision | Description of Changes                |
|---------------|----------|---------------------------------------|
| November-1992 | 1        | First Issue                           |
| 28-May-2004   | 2        | Stylesheet update. No content change. |

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