



# SD1729 (TH416)

## RF POWER BIPOLAR TRANSISTORS HF SSB APPLICATIONS

### FEATURES SUMMARY

- OPTIMIZED FOR SSB
- 30 MHz
- 28 VOLTS
- IMD -30 dB
- COMMON EMITTER
- GOLD METALLIZATION
- $P_{OUT} = 130$  W PEP WITH 12 dB GAIN

### DESCRIPTION

The SD1729 is a Class AB 28 V epitaxial silicon NPN planar transistor designed primarily for SSB communications. This device utilizes emitter ballasting to achieve extreme ruggedness under severe operating conditions.

Figure 1. Package

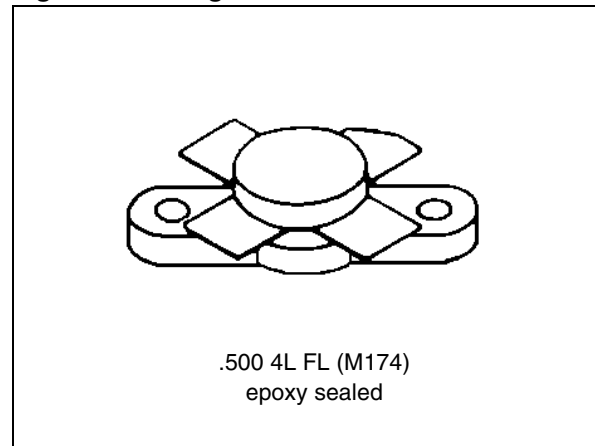


Figure 2. Pin Connection

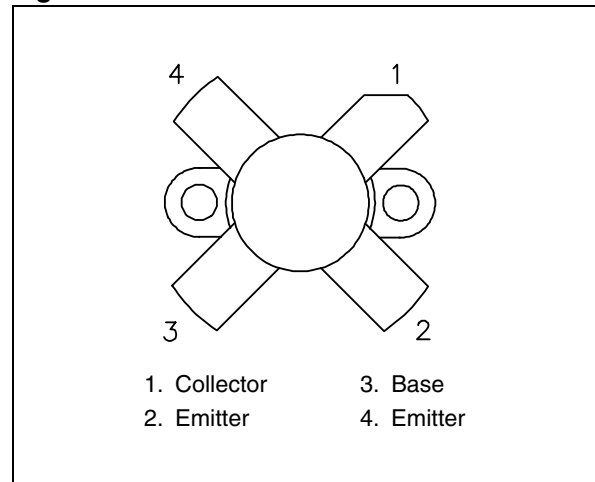


Table 1. Order Codes

| Order Codes    | Marking | Package | Packaging     |
|----------------|---------|---------|---------------|
| SD1729 (TH416) | SD1729  | M174    | PLASTIC TRAYS |

## SD1729 (TH416)

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

| Symbol            | Parameter                 | Value        | Unit               |
|-------------------|---------------------------|--------------|--------------------|
| $V_{\text{CBO}}$  | Collector-Base Voltage    | 70           | V                  |
| $V_{\text{CEO}}$  | Collector-Emitter Voltage | 35           | V                  |
| $V_{\text{EBO}}$  | Emitter-Base Voltage      | 4.0          | V                  |
| $I_{\text{C}}$    | Device Current            | 12           | A                  |
| $P_{\text{DISS}}$ | Power Dissipation         | 175          | 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 | 1.0   | $^{\circ}\text{C/W}$ |

## ELECTRICAL SPECIFICATIONS ( $T_{\text{case}} = 25^{\circ}\text{C}$ )

**Table 4. Static**

| Symbol            | Test Conditions  | Value |      |      | Unit |
|-------------------|--|-------|------|------|------|
|                   |  | Min.  | Typ. | Max. |      |
| $BV_{\text{CES}}$ | $I_{\text{C}} = 50 \text{ mA}; V_{\text{BE}} = 0 \text{ V}$  | 70    | —    | —    | V    |
| $BV_{\text{CEO}}$ | $I_{\text{C}} = 100 \text{ mA}; I_{\text{B}} = 0 \text{ mA}$ | 35    | —    | —    | V    |
| $BV_{\text{EBO}}$ | $I_{\text{E}} = 20 \text{ mA}; I_{\text{C}} = 0 \text{ mA}$  | 4.0   | —    | —    | V    |
| $I_{\text{CES}}$  | $V_{\text{CE}} = 35 \text{ V}; I_{\text{E}} = 0 \text{ mA}$  | —     | —    | 20   | mA   |
| $h_{\text{FE}}$   | $V_{\text{CE}} = 5 \text{ V}; I_{\text{C}} = 7 \text{ A}$    | 18    | —    | 50   | —    |

**Table 5. Dynamic**

| Symbol             | Test Conditions  | Value |      |      | Unit |
|--------------------|--|-------|------|------|------|
|                    |  | Min.  | Typ. | Max. |      |
| $P_{\text{OUT}}$   | $f = 30 \text{ MHz}; V_{\text{CE}} = 28 \text{ V}; I_{\text{CQ}} = 150 \text{ mA}$                 | 130   | —    | —    | W    |
| $G_{\text{P}}$     | $P_{\text{OUT}} = 130 \text{ W PEP}; V_{\text{CE}} = 28 \text{ V}; I_{\text{CQ}} = 150 \text{ mA}$ | 12    | —    | —    | dB   |
| $\text{IMD}^{(1)}$ | $P_{\text{OUT}} = 130 \text{ W PEP}; V_{\text{CE}} = 28 \text{ V}; I_{\text{CQ}} = 150 \text{ mA}$ | —     | —    | -30  | dBc  |
| $\eta_{\text{c}}$  | $P_{\text{OUT}} = 130 \text{ W PEP}; V_{\text{CE}} = 28 \text{ V}; I_{\text{CQ}} = 150 \text{ mA}$ | 37    | —    | —    | %    |
| $C_{\text{OB}}$    | $f = 1 \text{ MHz}; V_{\text{CB}} = 28 \text{ V}$  | —     | 220  | —    | pF   |

Note: 1.  $f_1 = 30.00 \text{ MHz}, f_2 = 30.001 \text{ MHz}$

TYPICAL PERFORMANCE

Figure 3. Safe Operating Area

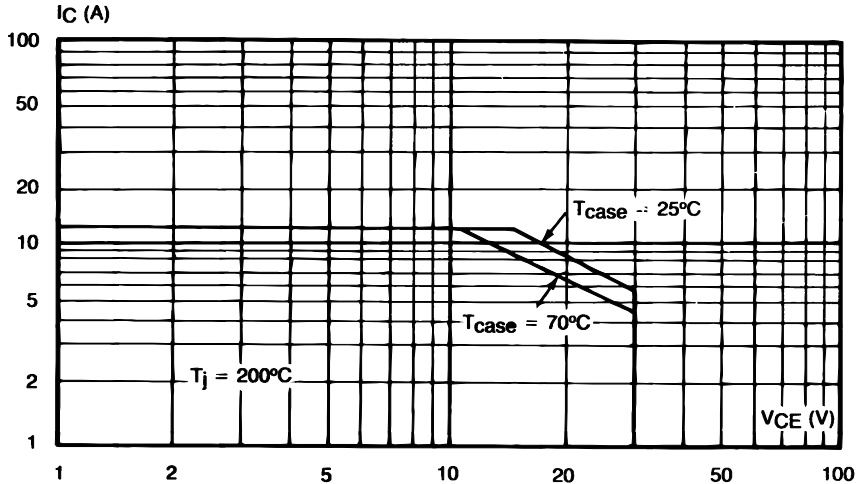
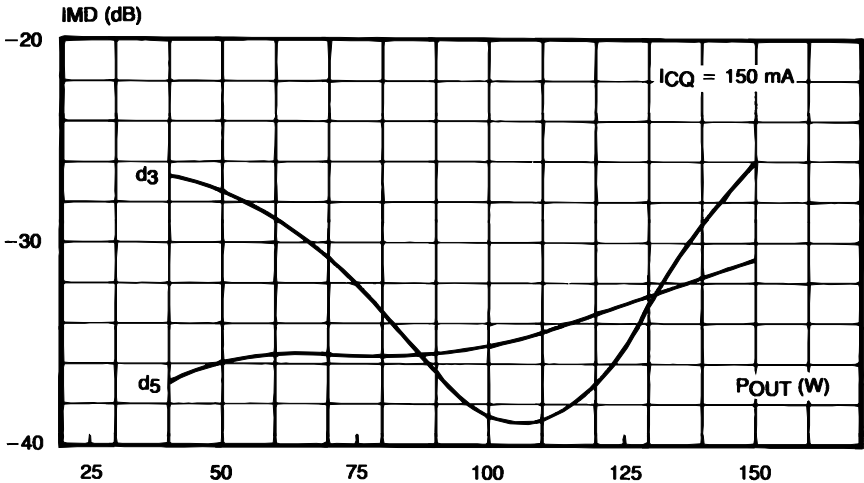


Figure 4. Intermodulation Distortion vs Power Output



TEST CIRCUIT

Figure 5. Test Circuit 3

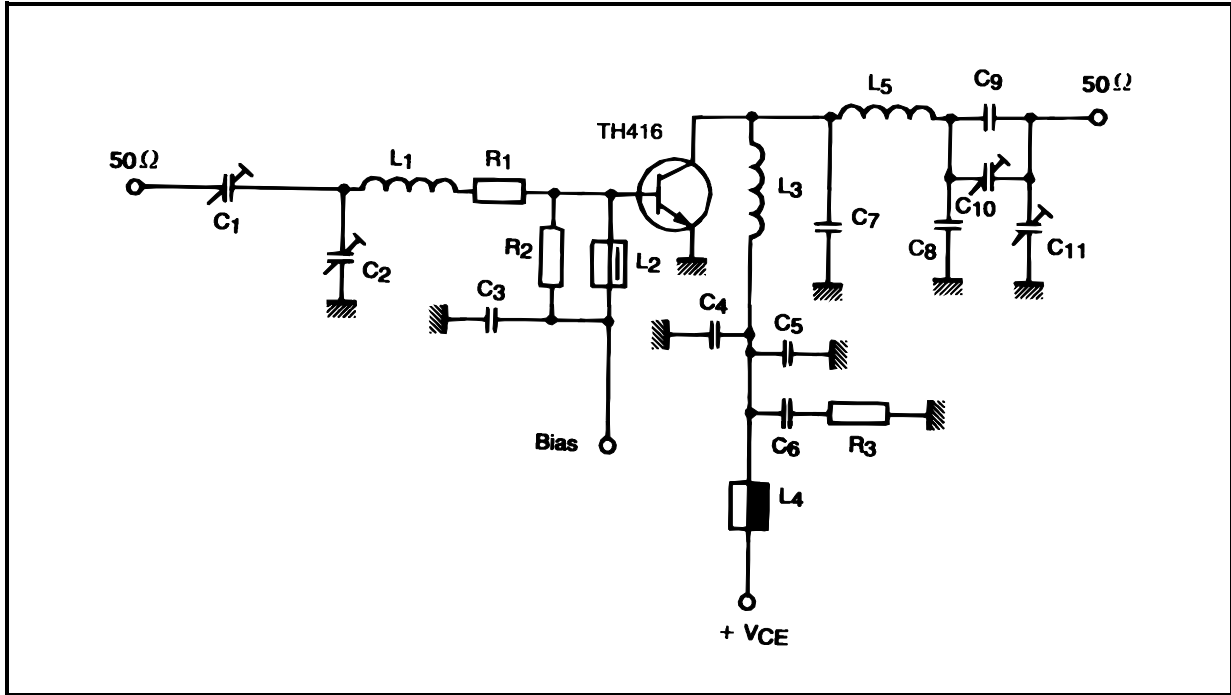


Table 6. Test Circuit

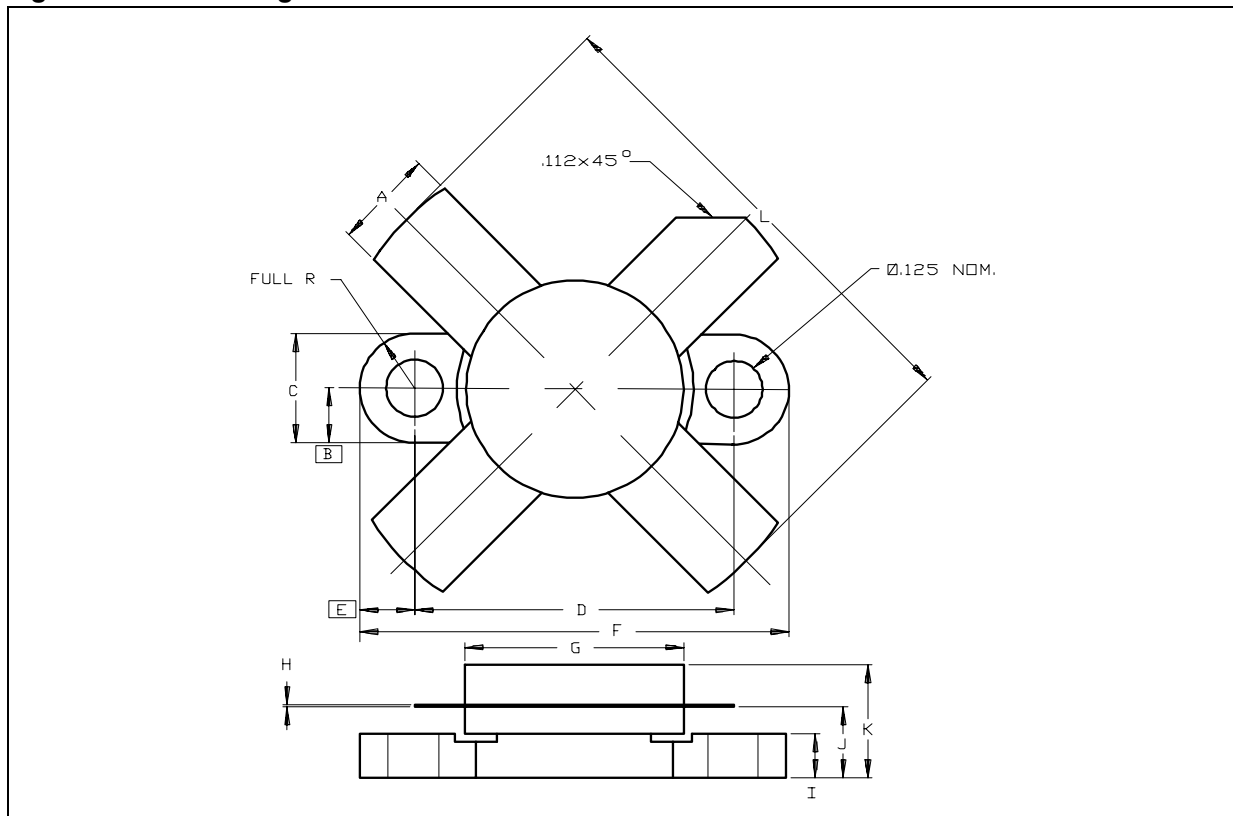
|          |                               |
|----------|-------------------------------|
| C1       | 20 – 120pF                    |
| C2       | 50 – 300pF                    |
| C3, C4   | 3.9nF                         |
| C5       | 100nF                         |
| C6       | 2.2μF                         |
| C7       | 2 x 180pF in Parallel         |
| C8       | 3 x 56pF and 33pF in Parallel |
| C9       | 4 x 56pF and 68pF in Parallel |
| C10, C11 | 360pF                         |
| L1       | 88nF                          |
| L2       | 22μH Choke Coil               |
| L3, L5   | 80nF                          |
| L4       | Ferroxcube Choke Coil         |
| R1       | 0.55Ω                         |
| R2       | 27Ω                           |
| R3       | 4.7Ω                          |

## PACKAGE MECHANICAL

Table 7. M174 Mechanical Data

| Symbol | millimeters |      |       | inches |       |       |
|--------|-------------|------|-------|--------|-------|-------|
|        | Min         | Typ  | Max   | Min    | Typ   | Max   |
| A      | 5.59        |      | 5.84  | 0.220  |       | 0.230 |
| B      |             | 3.18 |       |        | 0.125 |       |
| C      | 6.22        |      | 6.48  | 0.245  |       | 0.255 |
| D      | 18.28       |      | 18.54 | 0.720  |       | 0.730 |
| E      |             | 3.18 |       |        | 0.125 |       |
| F      | 24.64       |      | 24.89 | 0.970  |       | 0.980 |
| G      | 12.57       |      | 12.83 | 0.495  |       | 0.505 |
| H      | 0.08        |      | 0.18  | 0.003  |       | 0.007 |
| I      | 2.29        |      | 2.79  | 0.090  |       | 0.110 |
| J      | 4.06        |      | 4.45  | 0.160  |       | 0.175 |
| K      |             |      | 7.11  |        |       | 0.280 |
| L      |             |      | 26.67 |        |       | 1.050 |

Figure 6. M174 Package Dimensions



Note: Drawing is not to scale.

**REVISION HISTORY**

**Table 8. Revision History**

| <b>Date</b>   | <b>Revision</b> | <b>Description of Changes</b>         |
|---------------|-----------------|---------------------------------------|
| November-1992 | 1               | First Issue                           |
| 3-June-2004   | 2               | Stylesheet update. No content change. |

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