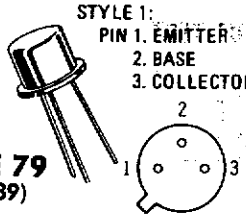
# 2N3866 (SILICON)
# 2N3866A




**CASE 79**
(TO-39)

Collector connected to case

NPN silicon transistor, designed for amplifier, frequency-multiplier, or oscillator applications in military and industrial equipment. Suitable for uses as output, driver, or pre-driver stages in VHF and UHF equipment.

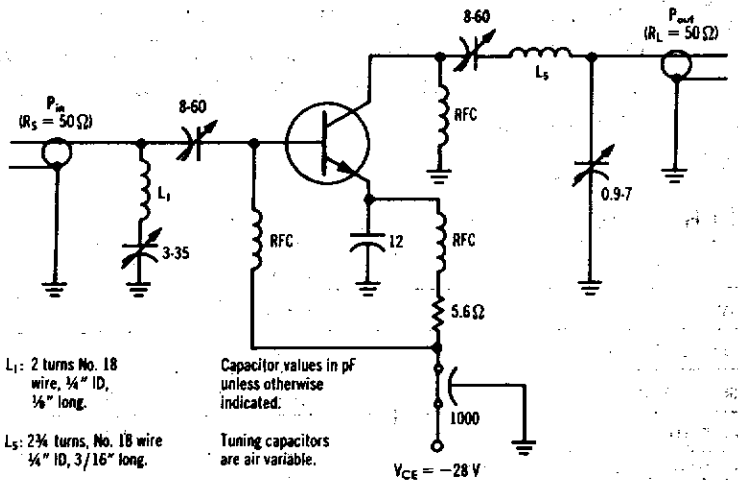
## MAXIMUM RATINGS ($T_A$ = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| Collector-Emitter | $V_{CEO}$ | 30 | Vdc |
| Collector-Base Voltage | $V_{CB}$ | 55 | Vdc |
| Emitter-Base Voltage | $V_{EB}$ | 3.5 | Vdc |
| Collector Current | $I_C$ | 0.4 | Amp |
| Total Device Dissipation @ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 5.0<br>28.6 | Watts<br>mW/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | -65 to +200 | °C |

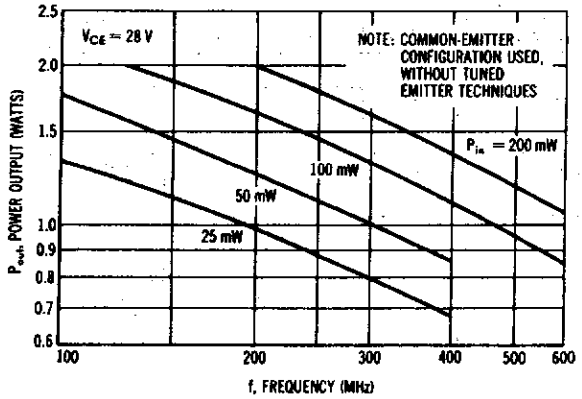
## ELECTRICAL CHARACTERISTICS ($T_A$ = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector-Emitter Breakdown Voltage ($I_C$ = 5.0 mAdc, $R_{BE}$ = 10 ohms) | $BV_{CER}$ | 55 | – | – | Vdc |
| Collector-Emitter Sustaining Voltage ($I_C$ = 5.0 mAdc, $I_B$ = 0) | $BV_{CEO(sus)}$ | 30 | – | – | Vdc |
| Collector-Base Breakdown Voltage ($I_E$ = 0, $I_C$ = 0.1 mAdc) | $BV_{CBO}$ | 55 | – | – | Vdc |
| Emitter-Base Breakdown Voltage ($I_E$ = 0.1 mAdc, $I_C$ = 0) | $BV_{EBO}$ | 3.5 | – | – | Vdc |
| Collector Cutoff Current ($V_{CE}$ = 28 Vdc, $I_B$ = 0) | $I_{CEO}$ | – | – | 20 | µA |
| Collector Cutoff Current ($V_{CE}$ = 55 Vdc, $V_{BE}$ = 1.5 Vdc) | $I_{CEX}$ | – | – | 100 | µAdc |
| **ON CHARACTERISTICS** | | | | | |
| DC Current Gain<br>($I_C$ = 0.36 Adc, $V_{CE}$ = 5.0 Vdc)<br>($I_C$ = 0.05 Adc, $V_{CE}$ = 5.0 Vdc) 2N3866<br>($I_C$ = 50 mAdc, $V_{CE}$ = 5.0 Vdc) 2N3866A | $h_{FE}$ | <br>5.0<br>10<br>25 | <br>–<br>–<br>– | <br>–<br>200<br>200 | – |
| Collector-Emitter Saturation Voltage ($I_C$ = 100 mAdc, $I_B$ = 20 mAdc) | $V_{CE(sat)}$ | – | – | 1.0 | Vdc |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Current-Gain – Bandwidth Product ($I_C$ = 50 mAdc, $V_{CE}$ = 15 Vdc, f = 200 MHz) 2N3866<br>2N3866A | $f_T$ | <br>500<br>800 | <br>800<br>– | <br>–<br>– | MHz |
| Output Capacitance ($V_{CB}$ = 30 Vdc, $I_E$ = 0, f = 1.0 MHz) | $C_{ob}$ | – | 2.0 | 3.0 | pF |
| **FUNCTIONAL TEST** | | | | | |
| Power Gain | Test Circuit-Figure 1<br>$P_{in}$ = 0.1 W, $V_{CE}$ = 28 Vdc<br>f = 400 MHz, $T_C$ = 25°C | $G_{pe}$ | 10 | – | – | dB |
| Power Output | | $P_{out}$ | 1.0 | – | – | Watts |
| Collector Efficiency | | $\eta$ | 45 | – | – | % |

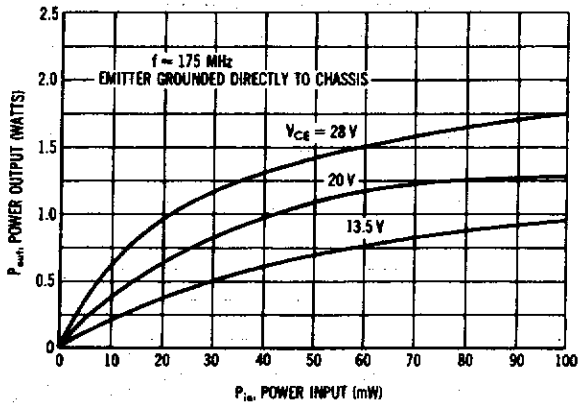
## FIGURE 1 — 400 MHz RF AMPLIFIER CIRCUIT FOR POWER-OUTPUT TEST



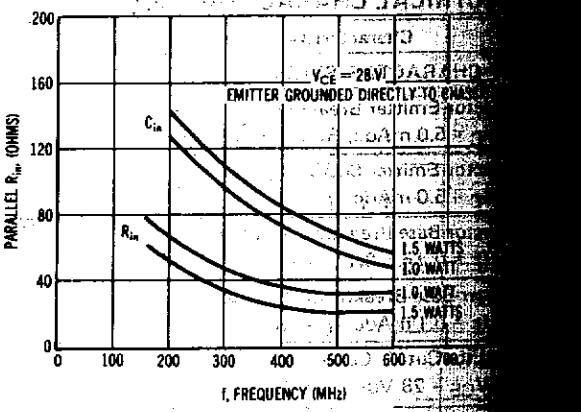

## FIGURE 2 — POWER OUTPUT versus FREQUENCY (Class C)




## FIGURE 3 — POWER OUTPUT versus POWER INPUT (Class C)




## FIGURE 4 — PARALLEL INPUT RESISTANCE CAPACITANCE versus FREQUENCY (Class C)




## FIGURE 5 — PARALLEL OUTPUT CAPACITANCE versus FREQUENCY (Class C)

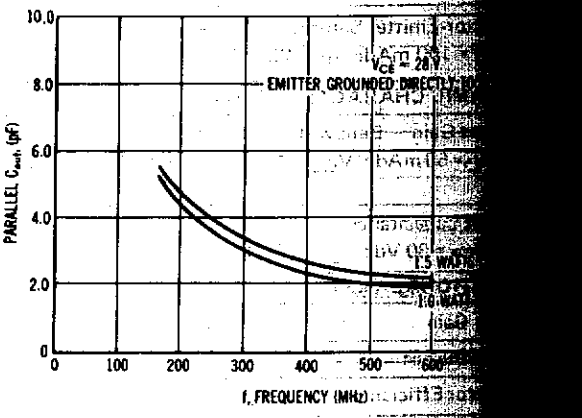


**FIGURE 6 — SMALL-SIGNAL CURRENT GAIN versus FREQUENCY**

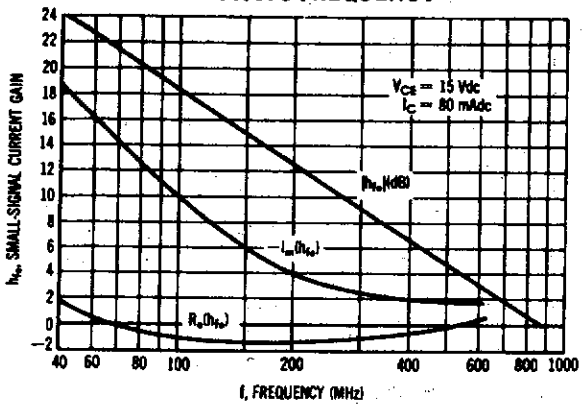



**FIGURE 7 — OUTPUT CAPACITANCE versus COLLECTOR VOLTAGE**

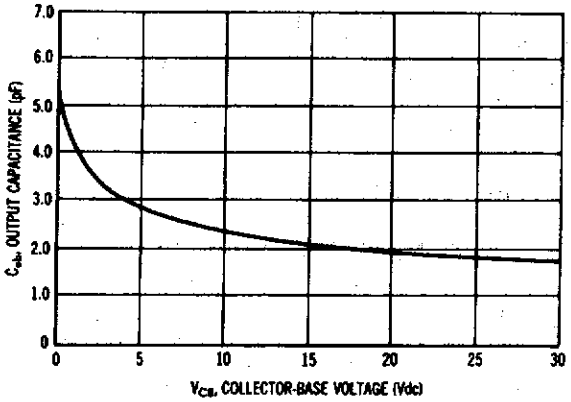



**FIGURE 8 — $f_T$ versus COLLECTOR CURRENT**

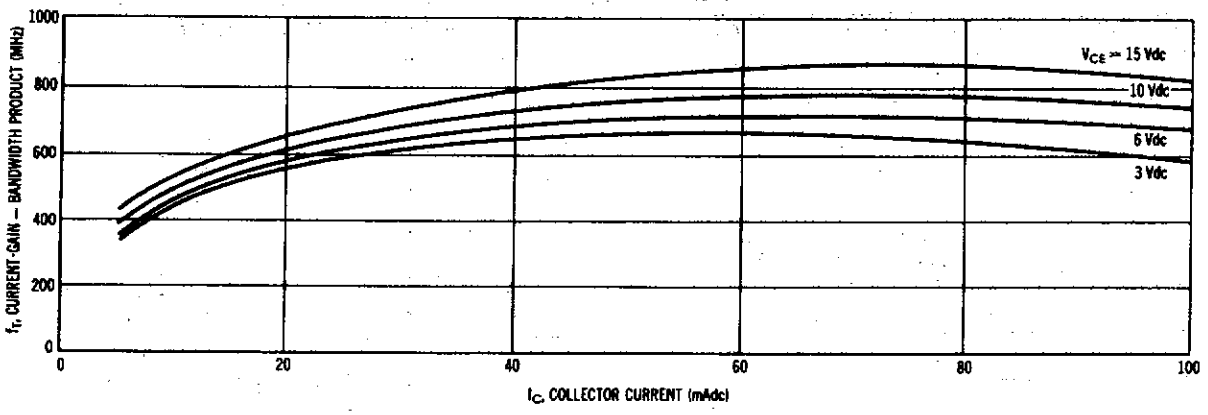



**FIGURE 9 — $r_b'C_c$ versus COLLECTOR CURRENT**

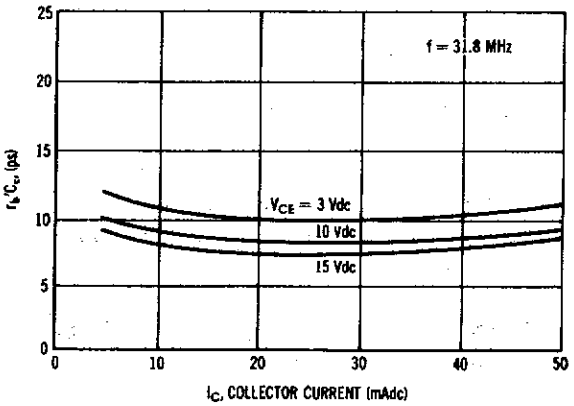



**FIGURE 10 — DC CURRENT GAIN versus COLLECTOR CURRENT**