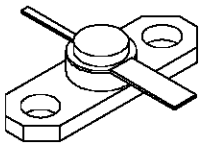
SGS-THOMSON MICROELECTRONICS

# MSC83303

## RF & MICROWAVE TRANSISTORS GENERAL PURPOSE AMPLIFIER APPLICATIONS

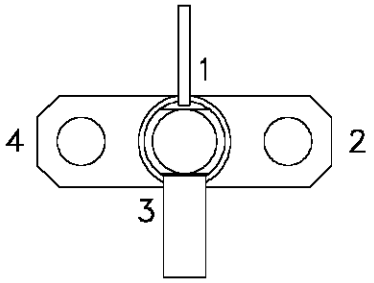
- REFRACTORY/GOLD METALLIZATION
- EMITTER BALLASTED
- VSWR CAPABILITY ∞:1 @ RATED CONDITIONS
- HERMETIC STRIPAC® PACKAGE
- $P_{OUT}$ = 3.0 W MIN. WITH 7.0 dB GAIN @ 3.0 GHz



**.250 2LFL (S010)**
hermetically sealed

| ORDER CODE | BRANDING |
|---|---|
| MSC83303 | 83303 |

**PIN CONNECTION**




1. Collector
2. Base
3. Emitter
4. Base

### DESCRIPTION

The MSC83303 is a common base hermetically sealed silicon NPN microwave power transistor utilizing an overlay, emitter site ballasted geometry with a refractory/gold metallization system. This device is capable of withstanding an infinite load VSWR at any phase angle under rated conditions. The MSC83303 is designed for Class C amplifier/oscillator applications in the 1.0 - 3.0 GHz frequency range.

### ABSOLUTE MAXIMUM RATINGS ($T_{case}$ = 25°C)

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $P_{DISS}$ | Power Dissipation* ($T_C \leq 50°C$) | 10.0 | W |
| $I_C$ | Device Current* | 540 | mA |
| $V_{CC}$ | Collector-Supply Voltage* | 30 | V |
| $T_J$ | Junction Temperature | 200 | °C |
| $T_{STG}$ | Storage Temperature | – 65 to +200 | °C |

### THERMAL DATA

| | | | |
|---|---|---|---|
| $R_{TH(j-c)}$ | Junction-Case Thermal Resistance* | 12 | °C/W |

*Applies only to rated RF amplifier operation

## ELECTRICAL SPECIFICATIONS ($T_{case}$ = 25°C)

STATIC

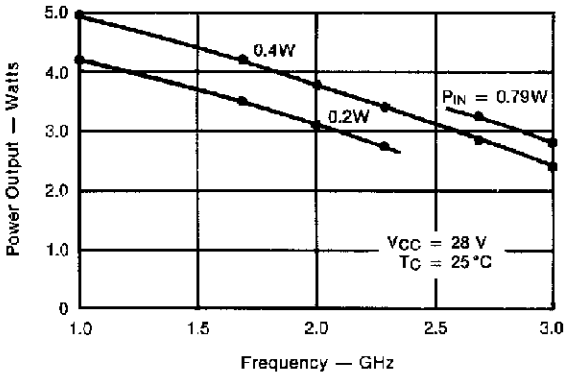
| Symbol | Test Conditions | | Value | | | Unit |
|---|---|---|---|---|---|---|
| | | | Min. | Typ. | Max. | |
| $BV_{CBO}$ | $I_C$ = 1 mA | $I_E$ = 0 mA | 45 | — | — | V |
| $BV_{EBO}$ | $I_E$ = 1 mA | $I_C$ = 0 mA | 3.5 | — | — | V |
| $BV_{CER}$ | $I_C$ = 5 mA | $R_{BE}$ = 10 Ω | 45 | — | — | V |
| $I_{CBO}$ | $V_{CB}$ = 28 V | | — | — | 0.5 | mA |
| $h_{FE}$ | $V_{CE}$ = 5 V | $I_C$ = 200 mA | 30 | — | 300 | — |

DYNAMIC

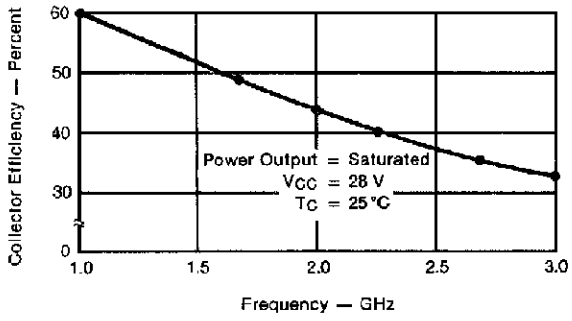
| Symbol | Test Conditions | | | Value | | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | Min. | Typ. | Max. | |
| $P_{OUT}$ | f = 3.0 GHz | $P_{IN}$ = 0.79 W | $V_{CC}$ = 28 V | 2.5 | 2.8 | — | W |
| ηc | f = 3.0 GHz | $P_{IN}$ = 0.79 W | $V_{CC}$ = 28 V | 30 | 33 | — | % |
| $P_G$ | f = 3.0 GHz | $P_{IN}$ = 0.79 W | $V_{CC}$ = 28 V | 5.0 | 5.5 | — | dB |
| $C_{OB}$ | f = 1 MHz | $V_{CB}$ = 28 V | | — | — | 5 | pF |

## TYPICAL PERFORMANCE

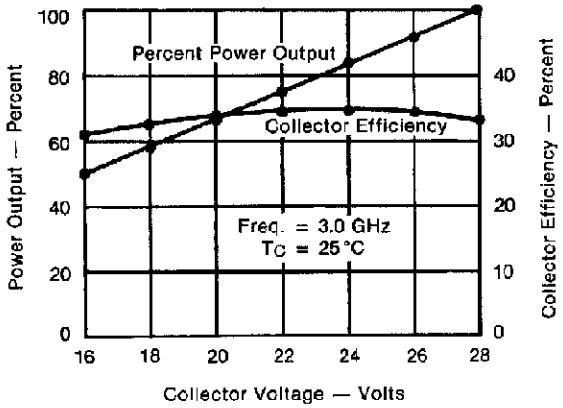
**TYPICAL POWER OUTPUT vs FREQUENCY**




**TYPICAL COLLECTOR EFFICIENCY vs FREQUENCY**

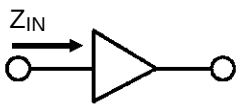


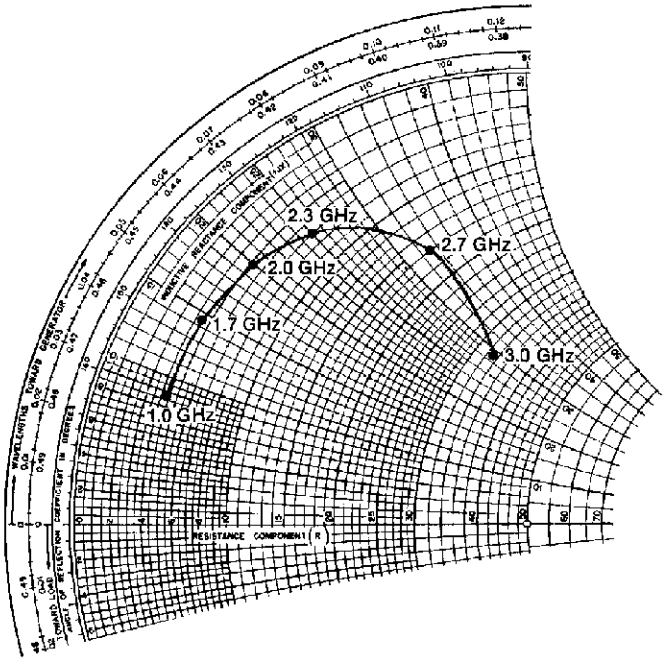

**PERCENT POWER OUTPUT & COLLECTOR EFFICIENCY vs COLLECTOR VOLTAGE**



## IMPEDANCE DATA

### TYPICAL INPUT IMPEDANCE

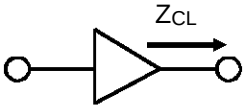


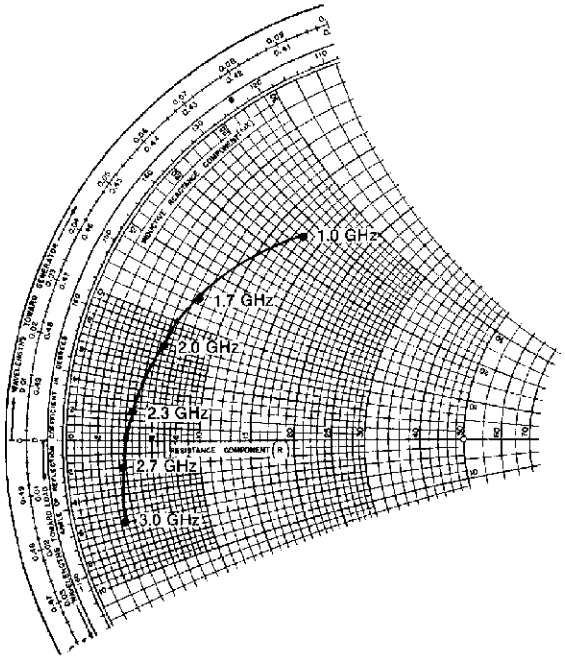




| FREQ. | $Z_{IN}$ (Ω) | $Z_{CL}$ (Ω) |
|---|---|---|
| 1.0 GHz | 4.4 + j 8.7 | 13.0 + j 23.0 |
| 1.7 GHz | 4.5 + j 14.5 | 7.5 + j 12.5 |
| 2.0 GHz | 5.1 + j 20.0 | 6.0 + j 7.8 |
| 2.3 GHz | 7.0 + j 25.0 | 4.5 + j 2.2 |
| 2.7 GHz | 16.0 + j 33.0 | 3.8 – j 2.0 |
| 3.0 GHz | 33.0 + j 29.0 | 3.3 – j 6.0 |

$P_{OUT}$ = Saturated
$V_{CC}$ = 28 V
Normalized to 50 ohms

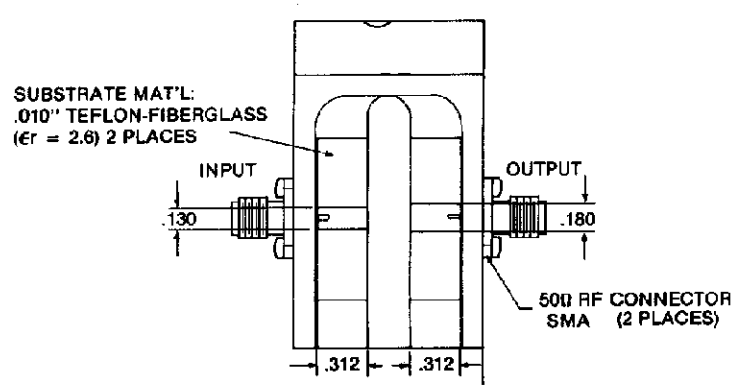
### TYPICAL COLLECTOR LOAD IMPEDANCE



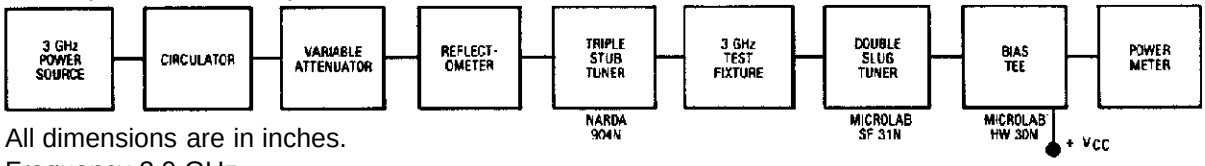



## TEST CIRCUIT

Ref.: Dwg. No. C125562



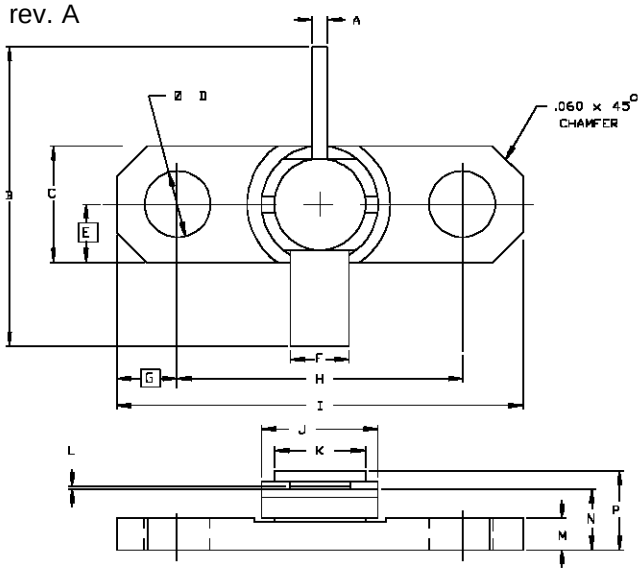

RF Amplifier Power Output Test




All dimensions are in inches.
Frequency 3.0 GHz

## PACKAGE MECHANICAL DATA

Ref. Dwg. No. 12-0216 rev. A




| SGS-THOMSON MICROELECTRONICS | | |
|---|---|---|
| | MINIMUM Inches/mm | MAXIMUM Inches/mm |
| A | .028/0,71 | .032/0,81 |
| B | .740/18,80 | |
| C | .245/6,22 | .255/6,48 |
| D | .128/3,25 | .132/3,35 |
| E | .125/3,18 | |
| F | .110/2,79 | .117/2,97 |
| G | .117/2,97 | |
| H | .560/14,22 | .570/14,48 |
| I | .795/20,19 | .805/20,45 |
| J | .225/5,72 | .235/5,97 |

| CONT'D | | |
|---|---|---|
| | MINIMUM Inches/mm | MAXIMUM Inches/mm |
| K | .165/4,19 | .185/4,70 |
| L | .003/0,08 | .007/0,18 |
| M | .058/1,47 | .068/1,73 |
| N | .119/3,02 | .135/3,43 |
| P | .149/3,78 | .187/4,75 |
| | | |
| | | |
| | | |
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