

# Part Number: IB1011S70

# Integra

TECHNOLOGIES, INC.

## L-Band Avionics Transistor

The high power pulsed avionics transistor device part number IB1011S70 is designed for L-Band radar systems operating between 1030 and 1090MHz. While operating in class C mode this common base device supplies a minimum of 70 watts of peak pulse power under the conditions of 8W input power, and 10 $\mu$ s pulse width, 1% duty cycle. All devices are 100% screened for large signal RF parameters.



### Silicon Bipolar

- Ultra-high  $f_T$

### Class C Operation

- High Efficiency

### Common Base Configuration

- Single Power Supply

### Gold Metal

- Maximum Reliability

### Emitter Ballasting

- Optimum Thermal Distribution

### Internal Impedance Matching

- Ease of Use
- Ultra-low Loss Design

### BeO Package

- Unmatched Thermal Reliability

### RF Test Fixture

- Broadband
- Matched to 50 $\Omega$
- Long-term Correlation
- 100% Device RF Screening
- No External Tuning Allowed

## TYPICAL DATA TYPICAL DATA TYPICAL DATA TYPICAL DATA

| Device  | Freq<br>(MHz) | Vcc<br>(V) | Pin<br>(W) | IRL<br>(dB) | Pout<br>(W) | Gp<br>(dB) | Ic<br>(A) | Nc<br>(%) | Droop<br>(dB) | VSWR |     |
|---------|---------------|------------|------------|-------------|-------------|------------|-----------|-----------|---------------|------|-----|
|         |               |            |            |             |             |            |           |           |               | 2 1  | 3 1 |
| D1790-1 | 1030          | 50         | 8          | 22          | 87.8        | 10.4       | 2.5       | 70        | -0.1          | s    | p   |
| D1790-4 | 1030          | 50         | 8          | 21          | 86.6        | 10.3       | 2.3       | 75        | -0.1          | s    | p   |

Pulse width = 10 us

Duty Cycle = 1 %

s = stable, p = passed

**MAXIMUM RATINGS**

| Screen | Parameter                                    | Symbol    | Min | Max  | Units | Test Conditions |
|--------|--|-----------|-----|------|-------|-----------------|
| BD     | Collector-Emitter Voltage                    | $V_{CES}$ | --  | 65   | V     | $V_{BE}=0V$ .   |
| BD     | Emitter-Base Voltage                         | $V_{EBO}$ | --  | 2    | V     | --              |
| BD     | Storage Temperature Range                    | $T_{STG}$ | -65 | +150 | °C    | --              |
| BD     | Operating Junction Temperature Range         | $T_J$     | --  | +200 | °C    | --              |
| Note   | Screen 'BD' = parameter qualified By Design. |           |     |      |       |                 |

**THERMAL CHARACTERISTICS**

| Screen | Parameter                                    | Symbol       | Min | Max  | Units | Test Conditions   |
|--------|--|--------------|-----|------|-------|---|
| BD     | Thermal Resistance                           | $R_{TH(JC)}$ | --  | 0.26 | °C/W  | $V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_n = 8W$ . |
| Note   | Screen 'BD' = parameter qualified By Design. |              |     |      |       |   |

**PROCESSING SPECIFICATIONS**

| Screen | Parameter  | Symbol | Min | Max | Units | Test Conditions                                |
|--------|--|--------|-----|-----|-------|--|
| 100%   | DC Wafer Probe   | --     | --  | --  | --    | Per Integra specification.                     |
| Q1     | Wafer DC and RF Qualification  | --     | --  | --  | --    | Per Integra specification.                     |
| LM     | Wire Bond Strength   | --     | --  | --  | --    | Line monitor per Integra specification.        |
| 100%   | Pre-cap visual inspection  | --     | --  | --  | --    | Per Integra specification.                     |
| 100%   | Gross leak test  | --     | --  | --  | --    | MIL-STD-750D, Method 1071.6, Test Condition C. |
| Note   | Screen 'Q1' = parameter is qualified by assembly and test of 3 pieces minimum per wafer. |        |     |     |       |  |
| Note   | Screen 'LM' = parameter is qualified by assembly line monitor.                           |        |     |     |       |  |

**DC ELECTRICAL CHARACTERISTICS**

| Screen | Parameter                                   | Symbol     | Min | Max | Units | Test Conditions                                     |
|--------|---|------------|-----|-----|-------|---|
| 100%   | Collector-Emitter Breakdown Voltage         | $BV_{CES}$ | 65  | --  | V     | $I_C=15mA$ , $V_{BE}=0V$ , $T_F=25\pm5^\circ C$ .   |
| 100%   | Zero Base Voltage Collector Leakage Current | $I_{CES}$  | --  | 3   | mA    | $V_{CE}=50V$ , $V_{BE}=0V$ , $T_F=25\pm5^\circ C$ . |
| 100%   | DC Current Gain                             | $H_{FE}$   | 5   | 100 | --    | $V_{CE}=5V$ , $I_C=0.1A$ , $T_F=25\pm5^\circ C$ .   |

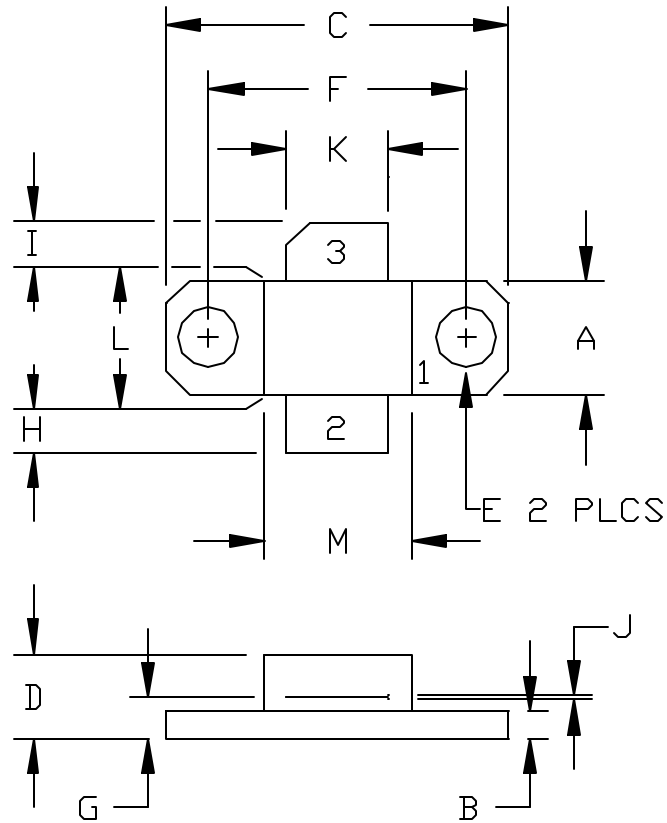
**RF ELECTRICAL CHARACTERISTICS**

| Screen | Parameter  | Symbol    | Min | Max | Units | Test Conditions  |
|--------|--|-----------|-----|-----|-------|--|
| 100%   | Input Return Loss  | IRL       | 10  | --  | dB    | $V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$   |
| 100%   | Output Power   | $P_{Out}$ | 70  | --  | W     | $V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$   |
| 100%   | Power Gain   | Gp        | 9.4 | --  | dB    | $V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$   |
| 100%   | Collector Efficiency ( $P_o/I_c/V_{CC}$ )                                  | $N_c$     | 55  | --  | %     | $V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$   |
| 100%   | Pulse Amplitude Droop  | D         | --  | 0.5 | dB    | $V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$   |
| --     | --   | --        | --  | --  | --    | --   |
| 100%   | Stability into 1.5:1 VSWR.   | VSWR-S    | --  | --  | --    | Rotate 1.5:1 output VSWR through 360° phase.<br>No oscillatory or pulse break-up characteristics allowed on detected output pulse.<br>All non-harmonically related signals must be at least -65 dBc. |
| 100%   | 3:1 Load Mismatch Tolerance  | LMT       | --  | --  | --    | $V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$<br>Rotate 3:1 output VSWR through 360° phase.   |
| Note   | $V1 = 50V; PW1 = 10\mu s; DF1 = 1\%; P_{IN1} = 8W; F1 = 1030 \text{ MHz}.$ |           |     |     |       |  |
| Note   | $T_F =$ Device flange temperature.   |           |     |     |       |  |
| Note   | Screen 'BD' = parameter qualified By Design.                               |           |     |     |       |  |

**RF TEST FIXTURE IMPEDANCE CHARACTERISTICS-PRELIMINARY**

| Frequency (GHz)      | $Z_F (W)$ | $Z_{OF} (W)$ |
|----------------------|-----------|--------------|
| 1030                 | 4-j3      | 3.8+j5.5     |
| Impedance Definition |           |              |

PACKAGE DIMENSIONAL OUTLINE DRAWING



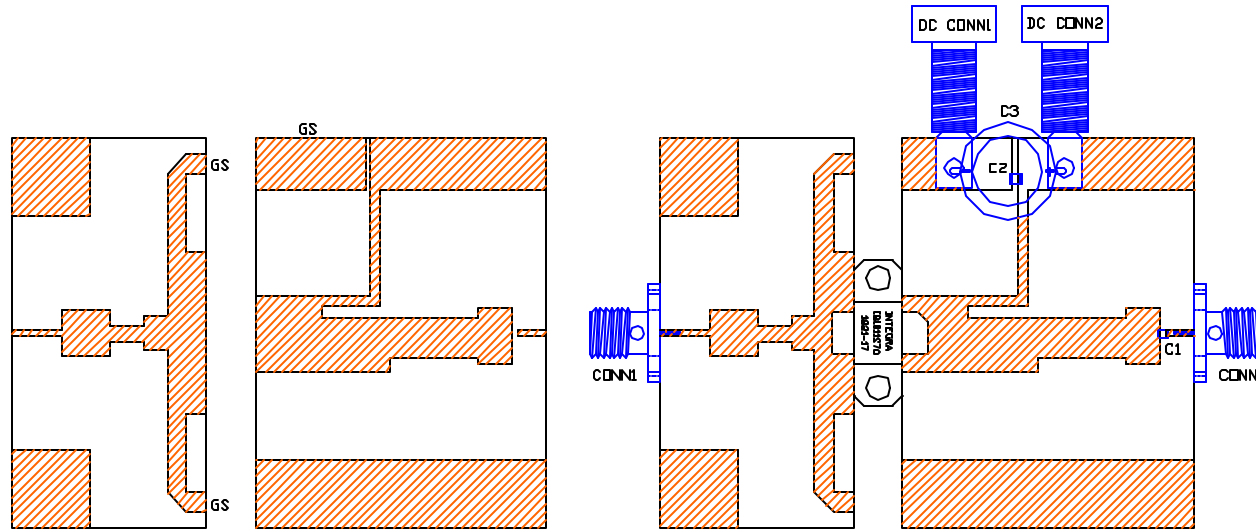
| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.243  | 0.253 | 6.17        | 6.43  |
| B   | 0.055  | 0.065 | 1.40        | 1.65  |
| C   | 0.739  | 0.749 | 18.77       | 19.02 |
| D   | 0.178  | 0.188 | 4.52        | 4.78  |
| E   | 0.125  | 0.135 | 3.18        | 3.43  |
| F   | 0.555  | 0.565 | 14.10       | 14.35 |
| G   | 0.082  | 0.092 | 2.08        | 2.34  |
| H   | 0.080  | 0.150 | 2.79        | 3.56  |
| I   | 0.080  | 0.150 | 2.03        | 2.54  |
| J   | 0.004  | 0.006 | 0.10        | 0.15  |
| K   | 0.215  | 0.225 | 5.46        | 5.72  |
| L   | 0.245  | 0.255 | 6.22        | 6.48  |
| M   | 0.315  | 0.325 | 8.00        | 8.26  |

| PIN SCHEDULE |           |
|--------------|-----------|
| 1            | BASE      |
| 2            | EMITTER   |
| 3            | COLLECTOR |

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|                               |            |
|-------------------------------|------------|
| DOCUMENT NUMBER:<br>IB1011S70 | REV:<br>NC |
| SHEET NAME<br>06-OUTLINE      | REV<br>NC  |

RF TEST FIXTURE



| COMPONENT               | DESCRIPTION                                    |
|-------------------------|--|
| DUT                     | TRANSISTOR #IB1011S70, MOUNT HARD TO THE RIGHT |
| PC BOARD                | ROGERS #R03010, TH=0.025"                      |
| C1, C2                  | CHIP CAPACITOR, TYPE ATCL00A, 100 pF           |
| C3                      | ELECTROLYTIC CAPACITOR, 680UF / 63V            |
| GS                      | GROUND SHIELD, COPPER, TH=0.001"               |
| CONN1, CONN2            | SMA CONNECTOR, TYPE DS #ED32-1636-02           |
| INPUT PC BOARD CARRIER  | 2 INCH BRASS - 03 (1.00")                      |
| OUTPUT PC BOARD CARRIER | 2 INCH BRASS - 05 (1.50")                      |
| TRANSISTOR CARRIER      | 2 INCH COPPER - 01                             |
| TRANSISTOR CLAMP        | NIBYL CLAMP - 06                               |
| HEATSINK                | 2 INCH HEATSINK - 11                           |
| DC CONN1                | BANANA JACK, BLACK                             |
| DC CONN2                | BANANA JACK, RED                               |
| NOTE                    | FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST |

ASSEMBLY AND PARTS LIST



**DEFINITIONS**

| <b>Data Sheet Status</b>   |   |
|--|---|
| Proposed Specification   | This data sheet contains proposed specifications.                                   |
| Preliminary Specification  | This data sheet contains specifications based on preliminary measurements and data. |
| Product Specification  | This data sheet contains final product specifications.                              |
| <b>Maximum Ratings</b>   |   |
| Stress above one or more of the maximum ratings may cause permanent damage to the device. These are maximum ratings only and operation of the device at these or at any other conditions above those given in the characteristics sections of the specification is not implied. Exposure to maximum values for extended periods of time may affect device reliability. |   |

**WARNING**

| <b>Product and environmental safety - toxic materials</b>  |
|--|
| This product contains beryllium oxide. The product is entirely safe provided that the BeO base is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with general or domestic waste. |

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|  |
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传真：0755-83376182 (0) 13823648918 MSN: SUNS8888@hotmail.com

邮编：518033 E-mail:szss20@163.com QQ: 195847376

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TEL: 021-28311762 56703037 13701955389 FAX: 021-56703037

西安分公司：西安高新开发区 20 所(中国电子科技集团导航技术研究所)

西安劳动南路 88 号电子商城二楼 D23 号

TEL: 029-81022619 13072977981 FAX:029-88789382