Part Number: IB3134M70

Integra
TECHNOLOGIES, INC.

S-Band Radar Transistor

The medium power pulsed radar transistor device part number IB3134M70 is designed for S-Band radar systems operating over the instantaneous bandwidth of 3.1-3.4 GHz. While operating in class C mode this common base device supplies a minimum of 70 watts of peak pulse power under the conditions of 300μs pulse width and 10% duty cycle. All devices are 100% screened for large signal RF parameters, including power gain compression. Excellent spectral stability into output mismatch over a broad input power range make it ideal for use in reliable high power solid state transmitters. The test fixture includes a passive amplitude sloping network to insure that the device is not overdriven as the operating frequency decreases.

TYPICAL DATA TYPICAL DATA TYPICAL DATA TYPICAL DATA

Test Sequence Name	Freq (GHz)	PW (us)	Duty (%)	Vcc (V)	P_{IN} (W)	P_{REF} Cal Factor	P_{REF} (W)	IRL (dB)	P_{OUT} (W)	G_P (dB)	OPC (dB)	OPF (dB)	I_C (A)	n_C (%)	IP (deg)	Droop (dB)	VSWR-S 1.5:1	LMT VSWR 2:1
OPC	3.100	300	10	36.0	13.50	--	--	--	92.9	--	0.27	--	--	--	--	--	--	--
Nominal	3.100	300	10	36.0	12.00	31.30	0.59	-13	87.3	8.6	--	0.67	4.84	50	--	0.03	--	P
1.5:1 Stability/OD	3.100	300	10	36.0	15.10	--	--	--	--	--	--	--	--	--	--	--	S	--
OPC	3.250	300	10	36.0	13.50	--	--	--	90.8	--	0.12	--	--	--	--	--	--	--
Nominal	3.250	300	10	36.0	12.00	31.20	0.26	-17	88.3	8.7	--	--	5.22	47	507.0	-0.26	--	P
1.5:1 Stability/OD	3.250	300	10	36.0	15.10	--	--	--	--	--	--	--	--	--	--	--	S	--
OPC	3.400	300	10	36.0	13.50	--	--	--	78.9	--	0.18	--	--	--	--	--	--	--
Nominal	3.400	300	10	36.0	12.00	31.25	0.04	-25	75.7	8.0	--	--	5.03	42	--	-0.38	--	P
1.5:1 Stability/OD	3.400	300	10	36.0	15.10	--	--	--	--	--	--	--	--	--	--	--	S	--

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

Be0 Package
- Unmatched Thermal Reliability

RF Test Fixture
- Broadband
- Matched to 50Ω
- Long-term Correlation
- 100% Device RF Screening
- No External Tuning Allowed

Insertion Phase Marking
- 5° Increment Marking

US Patent Number
- US 6181200B1
- US 8344809B2

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MAXIMUM RATINGS

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Collector-Emitter Voltage	V_{CES}	--	70	V	V_{BE}=0V.
BD	Emitter-Base Voltage	V_{EBO}	--	3.5	V	--
BD	Collector Current, Peak	I_C	--	5.6	A	PW=300µs, DF=10%.
BD	Continuous Power Dissipation, Peak	P_D	--	178	W	PW=300µs, DF=10%, T_F=25°C.
BD	Storage Temperature Range	T_{STG}	-55	+150	°C	--
BD	Operating Junction Temperature Range	T_J	-55	+200	°C	--
Note	Screen 'BD' = parameter qualified By Design.					

THERMAL CHARACTERISTICS

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Thermal Resistance	$R_{TH(JC)}$	--	0.70	°C/W	V_{CC}=V1, PW=300µs, DF=10%, T_F=25±5°C, P_{OUT}=70W, F=3.4GHz.
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}	70	--	V	I_C=20mA, V_{BE}=0V, T_F=25±5°C.
100%	Zero Base Voltage Collector Leakage Current	I_{CES}	--	3.0	mA	V_{CE}=30V, V_{BE}=0V, T_F=25±5°C.
100%	DC Current Gain	H_{FE}	10	100	--	V_{CE}=5V, I_C=0.1A, T_F=25±5°C.

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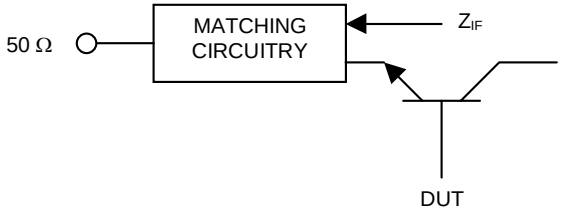
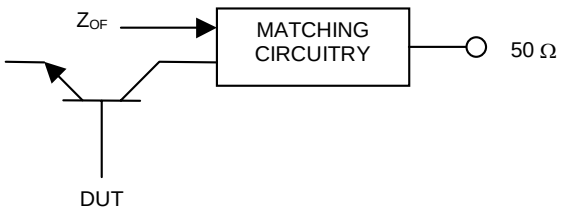
RF ELECTRICAL CHARACTERISTICS

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	IRL	7	--	dB	V_{CC}=V1, PW=300µs, DF=10%, T_F=25±5°C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3.
100%	Output Power	P_O	70	--	W	V_{CC}=V1, PW=300µs, DF=10%, T_F=25±5°C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3.
100%	Collector Efficiency ($P_O/I_C/V_{CC}$)	N_C	38	--	%	V_{CC}=V1, PW=300µs, DF=10%, T_F=25±5°C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3.
100%	Pulse Amplitude Droop	D	--	0.6	dB	V_{CC}=V1, PW=300µs, DF=10%, T_F=25±5°C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3.
100%	Output Power Flatness =10*LOG(P_{OMAX}/P_{OMIN})	OPF	--	0.75	dB	Calculate from P_O at each frequency F.
100%	Output Power Compression =10*LOG(P_{OC}/P_O)	OPC	+0.01	+0.75	dB	P_{OC} measured with P_{IN} increased by 0.5dB at F=F1, F2, F3.
100%	Delta Insertion Phase Variation	d-IP	-20	+20	Deg	V_{CC}=V1, PW=300µs, DF=10%, T_F=25±5°C, P_{IN}=P_{IN2}, F=F2, Mark in 5° increments. Measure at PW÷2µs.
100%	Stability into 1.5:1 VSWR with +1.0dB overdrive	VSWR-S	--	--	--	Repeat P_O with P_{IN} increased by 1.0dB. Rotate 1.5:1 output VSWR through 360° phase. No oscillatory or pulse break-up characteristics allowed on detected output pulse. All non-harmonically related signals must be at least –65 dBc.
100%	2:1 Load Mismatch Tolerance	LMT	--	--	--	V_{CC}=V1, PW=300µs, DF=10%, T_F=25±5°C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3. Rotate 2:1 output VSWR through 360° phase. Post test P_O = Pre test P_O±2.5W.
BD	Pulse Risetime	RT	--	150	ns	V_{CC}=V1, PW=300µs, DF=10%, T_F=25±5°C, P_{IN}=P_{IN1}, P_{IN2}, P_{IN3}, F=F1, F2, F3. Measure between 10% and 90% detected power points.

Note	F1 = 3.10 GHz, F2 = 3.25 GHz, F3 = 3.40 GHz.
Note	P_{IN1} = 12.0W, P_{IN2} = 12.0W, P_{IN3} = 12.0W.
Note	T_F = Device flange temperature.
Note	Parts are binned and marked in 5 degree increments for Insertion Phase IP.
Note	V1 = 36 V.
Note	Screen 'BD' = parameter qualified By Design.

BROADBAND RF TEST FIXTURE IMPEDANCE CHARACTERISTICS

Frequency (GHz)	Z_{IF} (Ω) with resistor	Z_{IF} (Ω) without resistor	Z_{OF} (Ω)
3.10	3.7 – j5.2	3.5 – j5.1	4.1 – j5.5
3.25	3.2 – j4.8	3.3 – j4.8	4.0 – j4.9
3.40	2.5 – j4.1	3.0 – j4.3	3.8 – j4.3
Impedance Definition			

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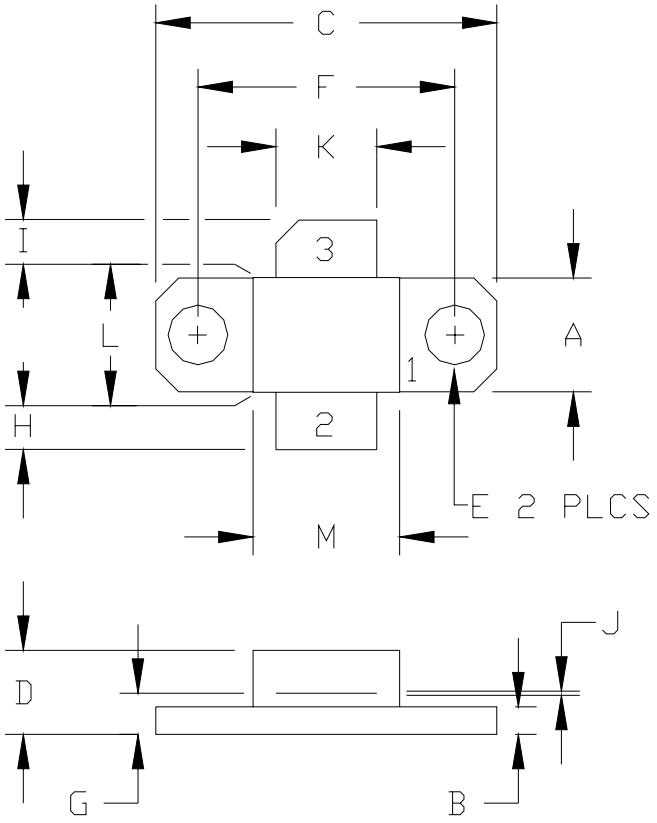
PACKAGE DIMENSIONAL OUTLINE DRAWING



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	0.120	2.03	3.05
I	0.080	0.120	2.03	3.05
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

DOCUMENT NUMBER:	REV:
IB3134M70	NC
SHEET NAME:	REV:
06-OUTLINE	NC

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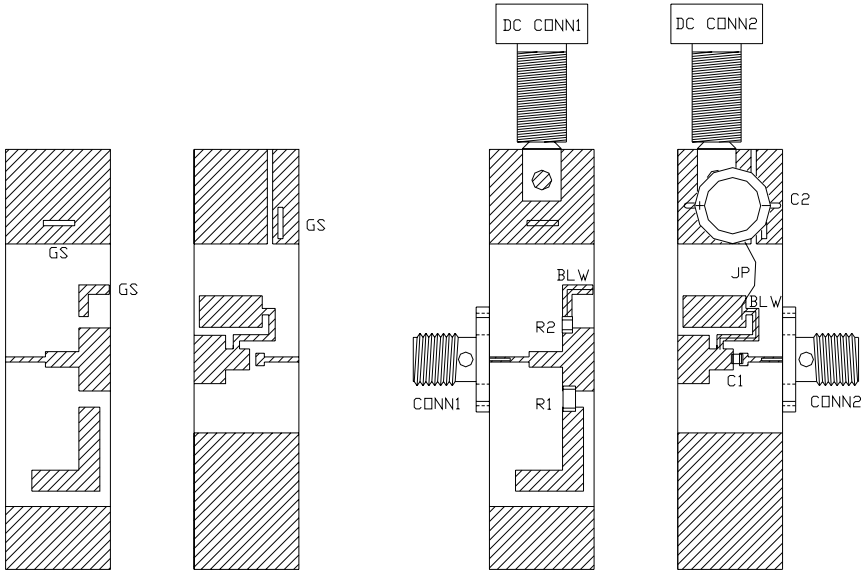
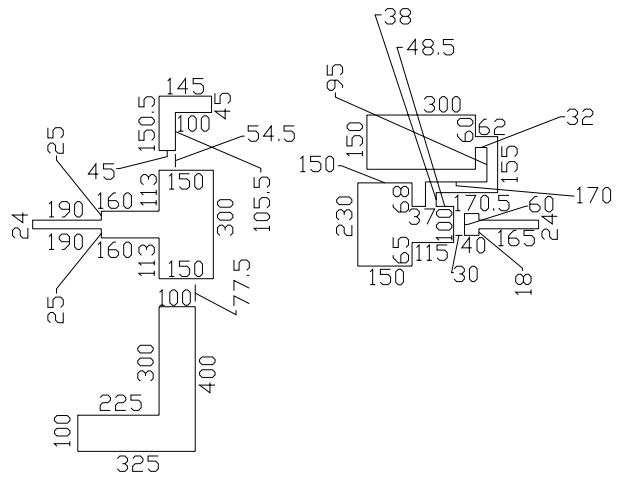
BROADBAND RF TEST FIXTURE

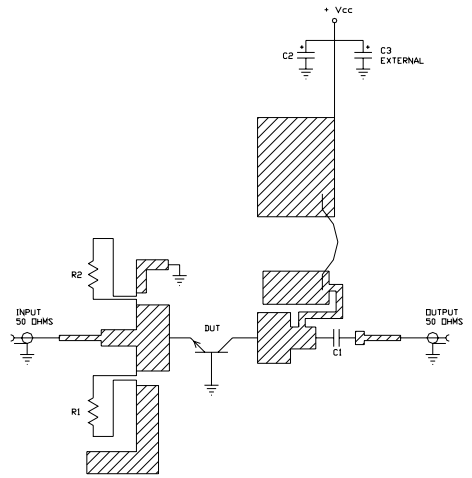


COMPONENT	DESCRIPTION
DUT	TRANSISTOR #IB3094, MOUNT HARD TO THE RIGHT
PC BOARD	ROGERS #RO3010, TH=0.025"
C1	CHIP CAPACITOR, TYPE ATC100A, 39 pF
C2	ELECTROLYTIC CAPACITOR, 68uF / 63V
C3 - NOT SHOWN	ELECTROLYTIC CAPACITOR, 2200uF / 63V
GS	GROUND SHIM, COPPER, TH=0.001"
CONN1, CONN2	SMA CONNECTOR, TYPE OS #2052-5636-02
INPUT PC BOARD CARRIER	2 INCH BRASS - 01
OUTPUT PC BOARD CARRIER	2 INCH BRASS - 01
TRANSISTOR CARRIER	2 INCH COPPER - 01
TRANSISTOR CLAMP	NORYL CLAMP -01
HEATSINK	2 INCH HEATSINK - 09
DC CONN1	BANANA JACK, BLACK
DC CONN2	BANANA JACK, RED
BLW	BIAS LINE WIRE - COPPER - 0.022" DIA TYPICAL
R1	CHIP RESISTOR, 51 OHM, 5%, 1206 SIZE MSI # WA57PS-51ROJ-NS62
R2	CHIP RESISTOR, 0.100 OHM, 5%, 1206 SIZE, PANASONIC- # ERJ-8RSJR10V, DIGI-KEY # P.10PCT-ND
JP	JUMPER WIRE
NOTE	FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST

ASSEMBLY AND PARTS LIST



CIRCUIT DIMENSIONS IN MILS (1 MIL = 0.001")



ELECTRICAL SCHEMATIC

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DEFINITIONS

Data Sheet Status	
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.

Maximum Ratings

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

Product and environmental safety - toxic materials

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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