Part Number: IB3000S60

Integra
TECHNOLOGIES, INC.

S-Band Radar Transistor

The high power pulsed transistor part number IB3000S60 is designed to operate in class C mode. This common base device supplies a minimum of 60 watts of peak pulse power under the conditions of 12µs pulse width and 1% duty cycle. All devices are 100% screened for large signal RF parameters. Excellent spectral stability into output mismatch over a broad input power range make it ideal for use in reliable high power solid state amplifiers. It is designed to be used as a stand-alone device or to drive two IB3000S200 devices.

TYPICAL DATA TYPICAL DATA TYPICAL DATA TYPICAL DATA

Freq (GHz)	PW (us)	Duty (%)	Vcc (V)	P_{IN} (W)	IRL (dB)	P_{OUT} (W)	G_P (dB)	I_C (A)	n_C (%)	Droop (dB)
3.000	12	1	40.0	5.0	-13	73	11.7	3.50	52	0.05

- 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
  - Matched to 50Ω
  - Long-term Correlation
  - 100% Device RF Screening
  - No External Tuning Allowed
- US Patent Number
  - US 6181200 B1
  - US 6331931 B1

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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	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	$R_{TH(JC)}$	--	0.21	°C/W	V_{CC}=V1, PW=PW1, DF=DF1, T_F=25±5°C, P_{IN}=P_{IN}1, F=F1.
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, 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=10mA, V_{BE}=0V, T_F=25±5°C.
100%	Zero Base Voltage Collector Leakage Current	I_{CES}	--	1.5	mA	V_{CE}=30V, V_{BE}=0V, T_F=25±5°C.
100%	DC Current Gain	H_{FE}	10	150	--	V_{CE}=5V, I_C=0.1A, T_F=25±5°C.

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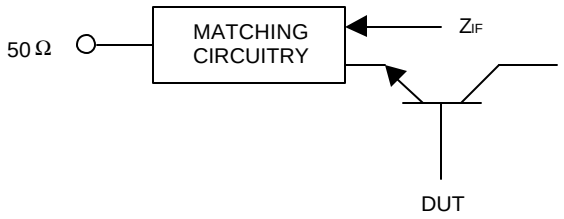
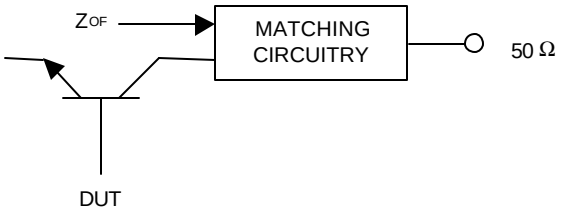
RF ELECTRICAL CHARACTERISTICS

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	IRL	7	--	dB	V_{CC}=V1, PW=PW1, DF=DF1, T_F=25±5°C, P_{IN}=P_{IN1}, F=F1.
100%	Output Power	P_{OUT}	60	--	W	V_{CC}=V1, PW=PW1, DF=DF1, T_F=25±5°C, P_{IN}=P_{IN1}, F=F1.
100%	Collector Efficiency ($P_{OUT}/I_C/V_{CC}$)	N_C	42	--	%	V_{CC}=V1, PW=PW1, DF=DF1, T_F=25±5°C, P_{IN}=P_{IN1}, F=F1.
100%	Intra-Pulse Amplitude Droop	D	--	0.3	dB	V_{CC}=V1, PW=PW1, DF=DF1, T_F=25±5°C, P_{IN}=P_{IN1}, F=F1.
100%	Stability into 1.5:1 VSWR	VSWR-S	--	--	--	V_{CC}=V1, PW=PW1, DF=DF1, T_F=25±5°C, P_{IN}=P_{IN1}, F=F1. 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%	3:1 Load Mismatch Tolerance	LMT	--	--	--	V_{CC}=V1, PW=PW1, DF=DF1, T_F=25±5°C, P_{IN}=P_{IN1}, F=F1. Rotate 3:1 output VSWR through 360° phase. Post-test P_{OUT} = Pre-test P_{OUT}±2W.
BD	Pulse Risetime	RT	--	100	ns	V_{CC}=V1, PW=PW1, DF=DF1, T_F=25±5°C, P_{IN}=P_{IN1}, F=F1. Measure between 10% and 90% detected power points.
Note	V1=40V; PW1=12µs; DF1=1%; F1 = 3.000 GHz, P_{IN1}=5.0W.					
Note	T_F = Device flange temperature.					
Note	Screen 'BD' = parameter qualified By Design.					

BROADBAND RF TEST FIXTURE IMPEDANCE CHARACTERISTICS

Frequency (GHz)	Z_{IF} (Ω)	Z_{OF} (Ω)
3.000	5.2 - j12	6.7 – j12
Impedance Definition		

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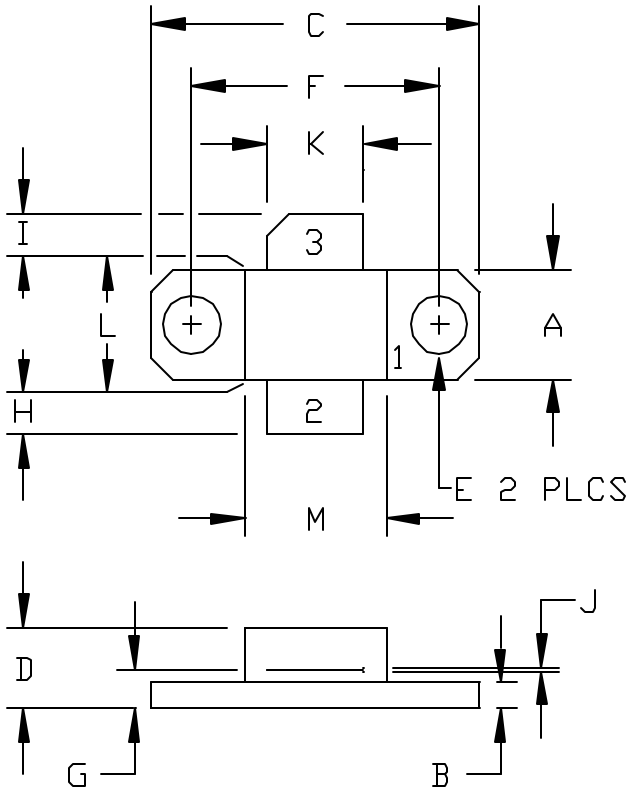
PACKAGE DIMENSIONAL OUTLINE DRAWING



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

TRANSISTOR-S-BAND-6DW

IB3000S60 NC-NC

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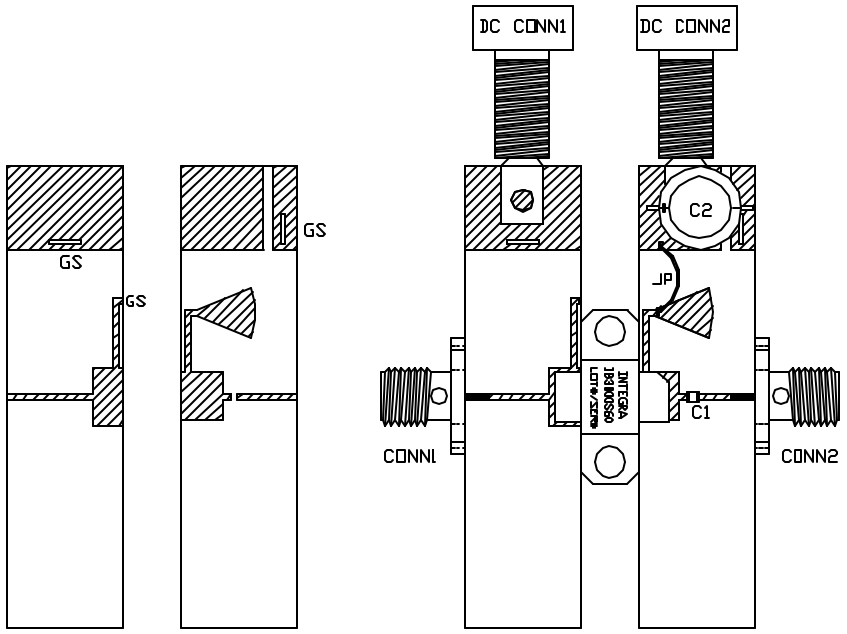
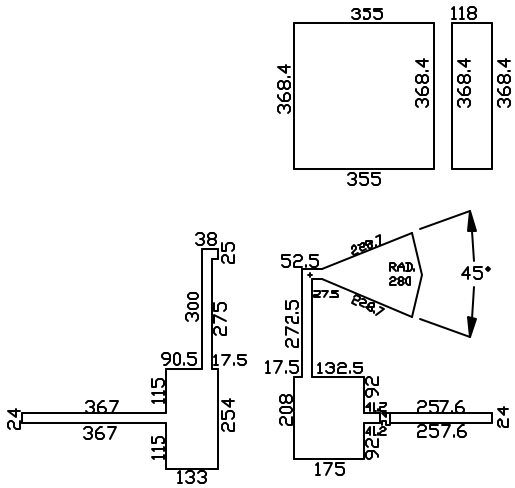
BROADBAND RF TEST FIXTURE

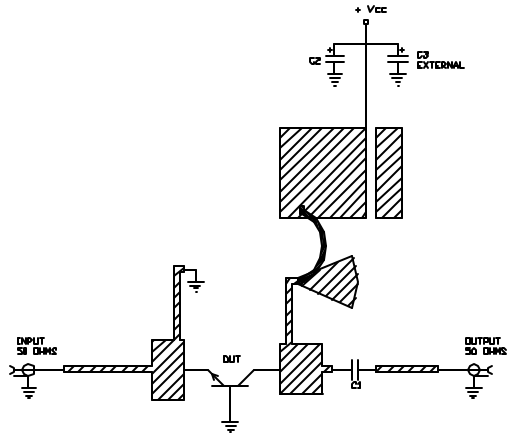




CIRCUIT DIMENSIONS IN MILS (1 MIL = 0.001")

COMPONENT	DESCRIPTION
DUT	TRANSISTOR #IB3000S60, MOUNT HARD TO THE RIGHT
PC BOARD	ROGERS #6010.2LM, TH=0.025", 1oz. Cu BOTH SIDES.
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
JP	JUMPER WIRE
NOTE	FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST

ASSEMBLY AND PARTS LIST



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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