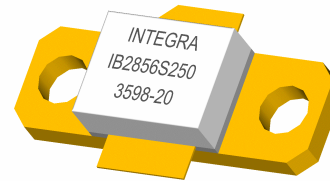


## S-Band Radar Transistor

The high power pulsed transistor part number IB2856S250 is designed to operate in class C mode. This common base device supplies a minimum of 250 watts of peak pulse power under the conditions of 12 $\mu$ s pulse width and 3% 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.



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

Insertion Phase Marking  
– 5 $^\circ$  Increment Marking

US Patent Number  
– 6,331,931,B1  
– 6,131,200,B1

### TYPICAL DATA      TYPICAL DATA      TYPICAL DATA      TYPICAL DATA

General Information	External Input Tuning	External Output Tuning	Freq (GHz)	PW (us)	Duty (%)	Vcc (V)	P <sub>IN</sub> (W)	IRL (dB)	P <sub>OUT</sub> (W)	G <sub>p</sub> (dB)	I <sub>c</sub> (A)	n <sub>c</sub> (%)	Droop (dB)	VSWR 1.5:1	VSWR 3:1
Date:	March 1, 2002	None	2.856	12	3	40.0	35.00	-18	298	9.3	18.23	41	-0.20	nm	nm
Assbly Lot - SN :	1256-3	None	2.856	12	3	40.0	31.19	-18	290	9.7	17.10	42	-0.20	nm	nm
Wafer :	940069-4	None	2.856	12	3	40.0	27.80	-19	278	10.0	15.97	44	-0.10	S	P
Test Fixture :	308/308	None	2.856	12	3	40.0	24.78	-20	266	10.3	14.83	45	-0.10	S	P
		None	2.856	12	3	40.0	22.08	-20	251	10.5	13.83	45	-0.10	S	P

**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	$R_{TH(JC)}$	--	0.10	°C/W	$V_{CC}=40V$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm 5^\circ C$ , $P_{OUT}=250W$ , $F=F1$ .
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	$I_C=40mA$ , $V_{BE}=0V$ , $T_F=25\pm 5^\circ C$ .
100%	Zero Base Voltage Collector Leakage Current	$I_{CES}$	--	7.5	mA	$V_{CE}=40V$ , $V_{BE}=0V$ , $T_F=25\pm 5^\circ C$ .
100%	DC Current Gain	$H_{FE}$	10	150	--	$V_{CE}=5V$ , $I_C=0.1A$ , $T_F=25\pm 5^\circ C$ .

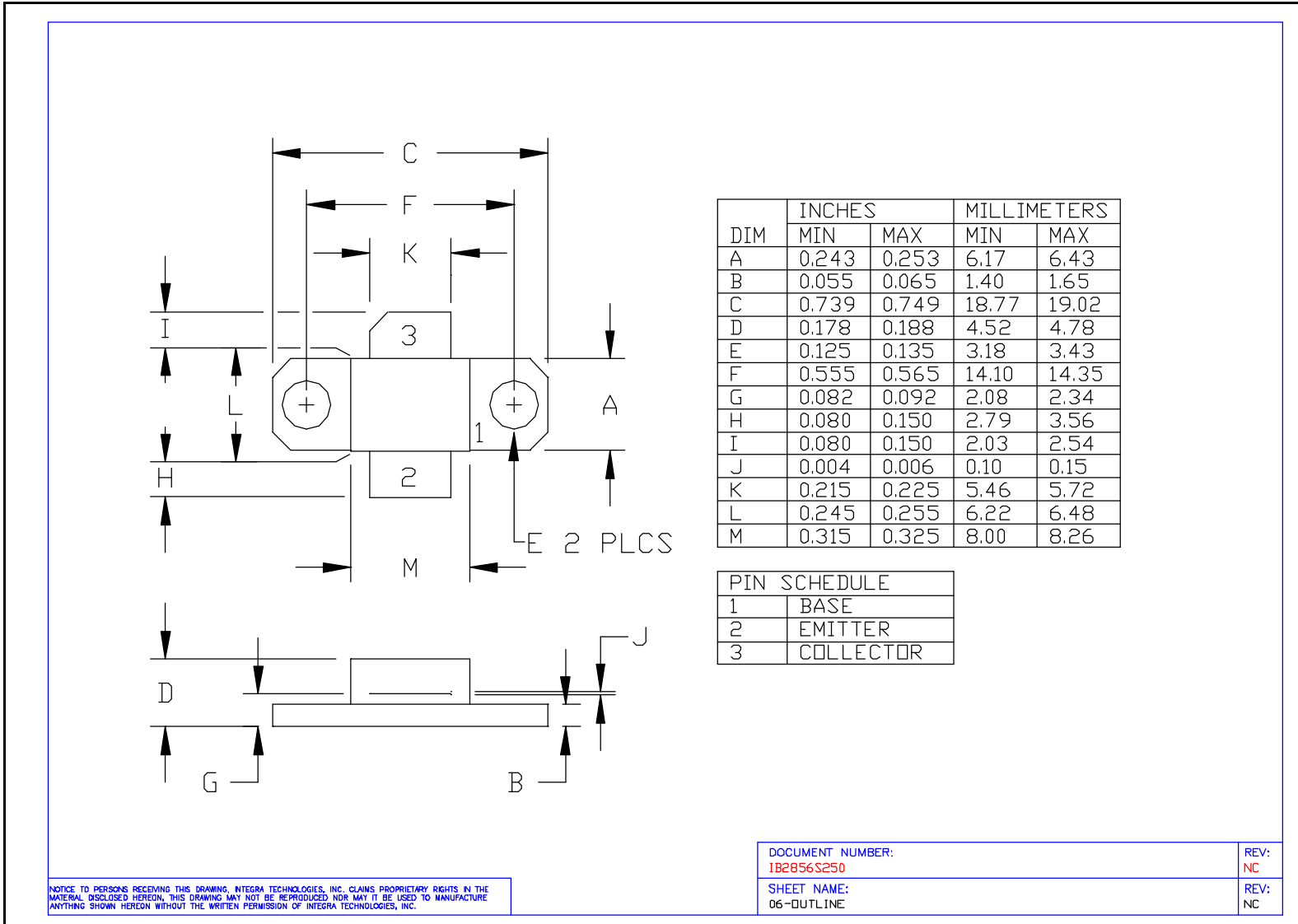
**RF ELECTRICAL CHARACTERISTICS**

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	$P_{OUT}$	250	--	W	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$
100%	Collector Efficiency ( $P_{OUT}/I_C/V_{CC}$ )	$N_C$	40	--	%	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$
100%	Intra-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%	Insertion Phase	IP	-30	+30	Deg	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$
100%	Stability into 1.5:1 VSWR	VSWR-S	--	--	--	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$ 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	--	--	--	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$ Rotate 3:1 output VSWR through 360° phase. Post-test $P_{OUT} = \text{Pre-test } P_{OUT} \pm 10W.$
BD	Pulse Risetime	RT	--	100	ns	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{IN}=P_{IN1}, F=F1.$ Measure between 10% and 90% detected power points.
Note	V1=40V; PW1=12µs; DF1=3%; F1 = 2.856 GHz, $P_{IN1}=27.5W.$					
Note	$T_F$ = Device flange temperature.					
Note	Parts are binned and marked in 5 degree increments for Insertion Phase IP.					
Note	Screen 'BD' = parameter qualified By Design.					

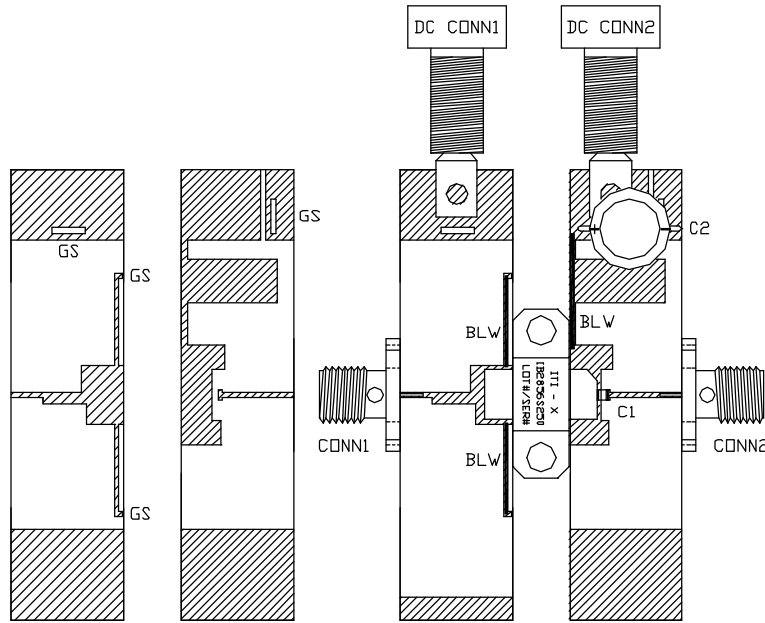
**BROADBAND RF TEST FIXTURE IMPEDANCE CHARACTERISTICS**

Frequency (GHz)	$Z_{IF}$ (W)	$Z_{OF}$ (W)
2.856	2.8 – j6.0	1.4 – j4.9
Impedance Definition		

**PACKAGE DIMENSIONAL OUTLINE DRAWING**

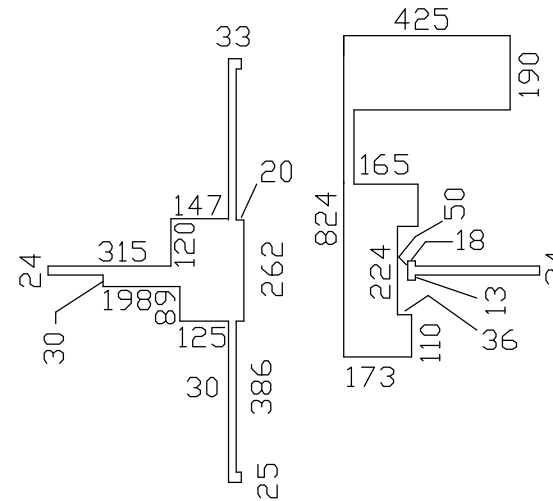


**BROADBAND RF TEST FIXTURE**

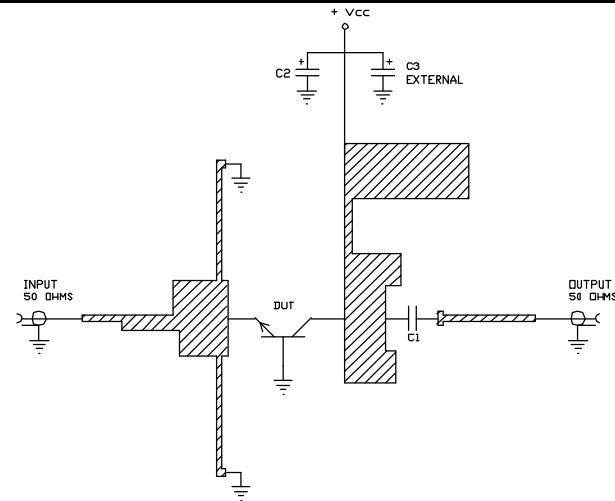


COMPONENT	DESCRIPTION
DUT	TRANSISTOR #IB2856S250, MOUNT HARD TO THE RIGHT
PC BOARD	ROGERS RT6010.2LM 1oz. Cu BOTH SIDES
C1	CHIP CAPACITOR, TYPE ATC100A, 39 pF
C2	ELECTROLYTIC CAPACITOR, 68uF / 63V
C3	ELECTROLYTIC CAPACITOR, 4700uF / 50V
GS	GROUND SHIM, COPPER, TH=0.001"
CONN1, CONN2	SMA CONNECTOR, TYPE DS #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	NDRYL 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
NOTE	FIXTURE HARDWARE DRAWINGS AVAILABLE ON REQUEST

**ASSEMBLY AND PARTS LIST**



**CIRCUIT DIMENSIONS IN MILS (1 MIL = 0.001")**



**ELECTRICAL SCHEMATIC**

**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.

**DISCLAIMER**

Integra Technologies Inc. reserves the right to make changes without further notice to any products herein. Integra Technologies Inc. makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Integra Technologies Inc. assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. Integra Technologies Inc. products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Integra Technologies Inc. customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Integra Technologies Inc. for any damages resulting from such improper use or sale.