

## S-Band Radar Transistor

The high power pulsed transistor part number IB2856S30 is designed to operate in class C mode. This common base device supplies a minimum of 30 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. Designed to be used as a driver device for IB2856S250 or as a stand-alone device.



### TYPICAL DATA    TYPICAL DATA    TYPICAL DATA    TYPICAL DATA

Freq (GHz)	PW (us)	Duty (%)	Vcc (V)	P <sub>IN</sub> (W)	IRL (dB)	IRL (P-F)	P <sub>OUT</sub> (W)	P <sub>OUT</sub> (P-F)	G <sub>p</sub> (dB)	I <sub>c</sub> (A)	n <sub>c</sub> (%)	n <sub>c</sub> (P-F)	Droop (dB)	Droop (P-F)	VSWR		VSWR	
															1.5:1	1.5:1 (P-F)	3:1	3:1 (P-F)
2.856	12	3	40.0	4.0	-17	P	39	P	9.8	1.93	50	P	-0.10	P	S	P	P	P

- Silicon Bipolar
  - Ultra-high f<sub>T</sub>
- 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

**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	$V_{EBO}$	--	3.0	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	$R_{TH(JC)}$	--	0.40	°C/W	$V_{CC}=V1$ , $PW=PW1$ , $DF=DF1$ , $T_F=25\pm5^\circ C$ , $P_{OUT}=30W$ , $F=F1$ .
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 1071.6, 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	$I_C=10mA$ , $V_{BE}=0V$ , $T_F=25\pm5^\circ C$ .
100%	Zero Base Voltage Collector Leakage Current	$I_{CES}$	--	1.5	mA	$V_{CE}=30V$ , $V_{BE}=0V$ , $T_F=25\pm5^\circ C$ .
100%	DC Current Gain	$H_{FE}$	10	150	--	$V_{CE}=5V$ , $I_C=0.1A$ , $T_F=25\pm5^\circ C$ .

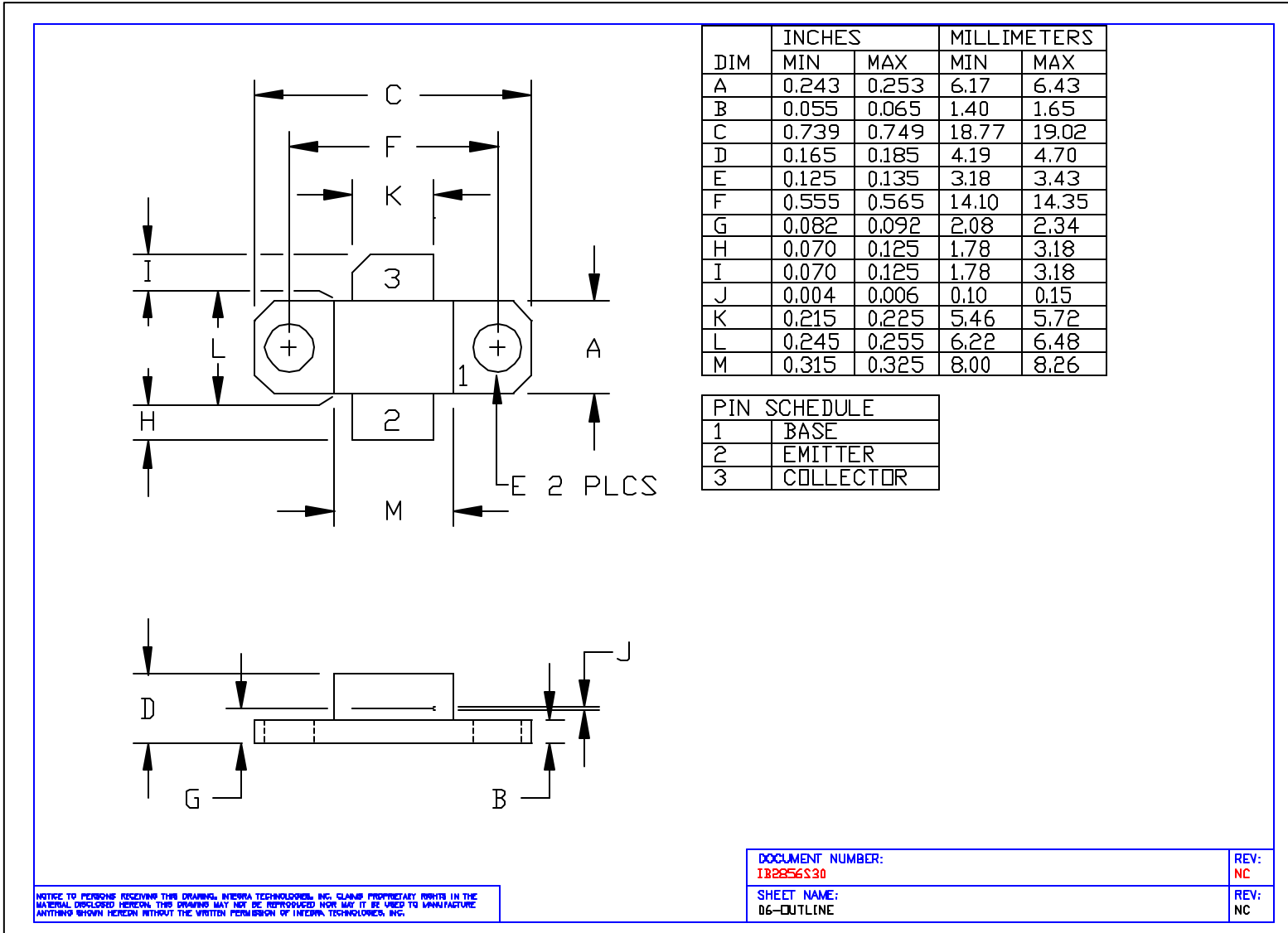
**RF ELECTRICAL CHARACTERISTICS**

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	IRL	10	--	dB	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_N=P_{IN1}, F=F1.$
100%	Output Power	$P_{OUT}$	30	--	W	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_N=P_{IN1}, F=F1.$
100%	Collector Efficiency ( $P_{OUT}/I_C/V_{CC}$ )	$N_C$	42	--	%	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_N=P_{IN1}, F=F1.$
100%	Intra-Pulse Amplitude Droop	D	--	0.3	dB	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_N=P_{IN1}, F=F1.$
100%	Stability into 1.5:1 VSWR	VSWR-S	--	--	--	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_N=P_{IN1}, F=F1.$ 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	--	--	--	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_N=P_{IN1}, F=F1.$ Rotate 3:1 output VSWR through 360° phase. Post-test $P_{OUT} = \text{Pre-test } P_{OUT} \pm 1W.$
BD	Pulse Risetime	RT	--	100	ns	$V_{CC}=V1, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_N=P_{IN1}, F=F1.$ Measure between 10% and 90% detected power points.
Note	V1=40V; PW1=12µs; DF1=3%; F1 = 2.856 GHz, $P_{IN1}=4.0W.$					
Note	$T_F$ = Device flange temperature.					
Note	Screen 'BD' = parameter qualified By Design.					

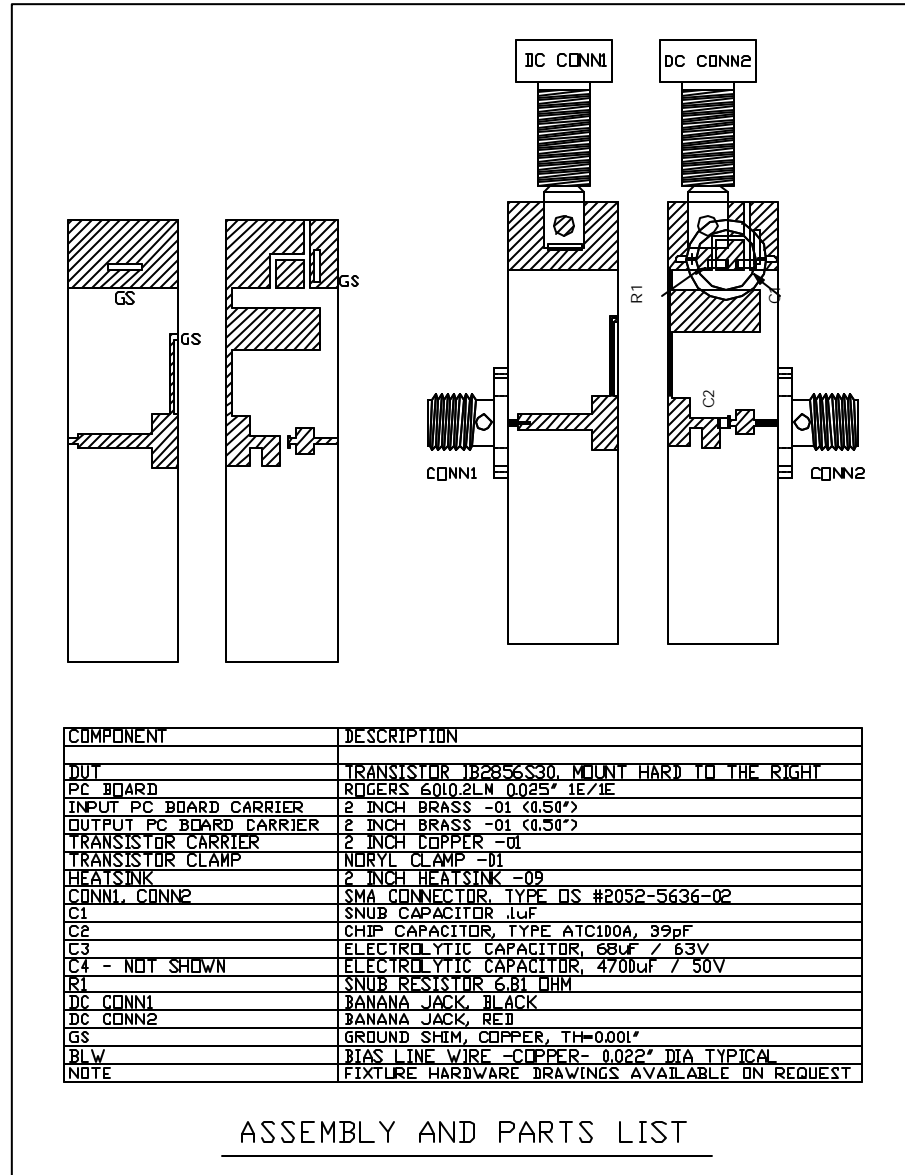
**BROADBAND RF TEST FIXTURE IMPEDANCE CHARACTERISTICS**

Frequency (GHz)	$Z_F$ (W)	$Z_{OF}$ (W)
2.856	$7.1 + j0.4$	$9.1 - j5.4$
Impedance Definition		

**PACKAGE DIMENSIONAL OUTLINE DRAWING**



**BROADBAND RF TEST FIXTURE**





**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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