

Wireless Bipolar Power Transistor, 10W

1.45 - 1.60 GHz

PH1516-10

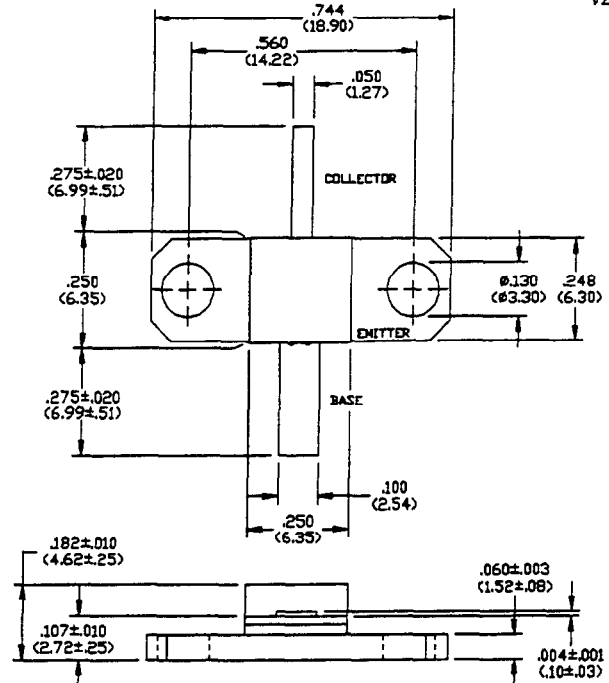
V2.00

Features

- Designed for Cellular Base Station Applications
- Class AB: -33 dBc Typ 3rd IMD at 10 Watts PEP
- Class A: +49 dBm Typ 3rd Order Intercept Point
- Common Emitter Configuration
- Internal Input Impedance Matching
- Diffused Emitter Ballasting

Absolute Maximum Ratings at 25°C

Parameter	Symbol	Rating	Units
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CES}	60	V
Emitter-Base Voltage	V_{EBO}	3.0	V
Collector Current	I_C	2.0	A
Total Power Dissipation	P_{TOT}	58	W
Junction Temperature	T_J	200	°C
Storage Temperature	T_{STG}	-55 to +150	°C
Thermal Resistance	θ_{JC}	3.0	°C/W



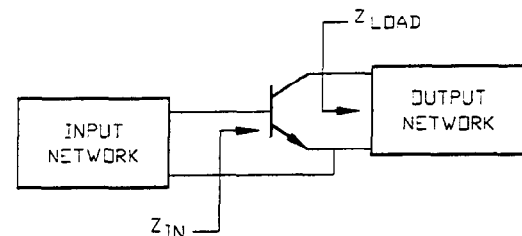
UNLESS OTHERWISE NOTED, TOLERANCES ARE INCHES ±.005" (MILLIMETERS ±.13MM)

Electrical Characteristics at 25°C

Parameter	Symbol	Min	Max	Units	Test Conditions
Collector-Emitter Breakdown Voltage	BV_{CES}	60	-	V	$I_C=20$ mA
Collector-Emitter Leakage Current	I_{CES}	-	2.0	mA	$V_{CE}=25$ V
Collector-Emitter Breakdown Voltage	BV_{CEO}	20	-	V	$I_C=20$ mA
Collector-Emitter Breakdown Voltage	BV_{CER}	30	-	V	$I_C=20$ mA, $R_{BE}=220 \Omega$
Emitter-Base Breakdown Voltage	BV_{EBO}	3.0	-	V	$I_B=20$ mA
DC Forward Current Gain	h_{FE}	15	120	-	$V_{CE}=5$ V, $I_C=1$ A
Power Gain	G_p	10	-	dB	$V_{CC}=25$ V, $I_{CO}=100$ mA, $P_{OUT}=10$ W, $F=1.50 - 1.60$ GHz
Collector Efficiency	η_C	40	-	%	$V_{CC}=25$ V, $I_{CO}=100$ mA, $P_{OUT}=10$ W, $F=1.50 - 1.60$ GHz
Input Return Loss	RL	10	-	dB	$V_{CC}=25$ V, $I_{CO}=100$ mA, $P_{OUT}=10$ W, $F=1.50 - 1.60$ GHz
Load Mismatch Tolerance	VSWR	-	3.0:1	-	$V_{CC}=25$ V, $I_{CO}=100$ mA, $P_{OUT}=10$ W, $F=1.50 - 1.60$ GHz
3rd Order IMD	IMD ₃	-	-30	dBc	$V_{CC}=25$ V, $I_{CO}=100$ mA, $P_{OUT}=10$ W PEP $F=1500$ MHz, $\Delta F=100$ kHz

Typical Device Impedances

F(GHz)	$Z_{IN}(\Omega)$	$Z_{LOAD}(\Omega)$
1.50	$1.4 + j4.8$	$2.1 - j0.3$
1.55	$2.0 + j5.0$	$2.0 - j0.4$
1.60	$2.5 + j4.9$	$2.0 - j0.5$



Specifications Subject to Change Without Notice.

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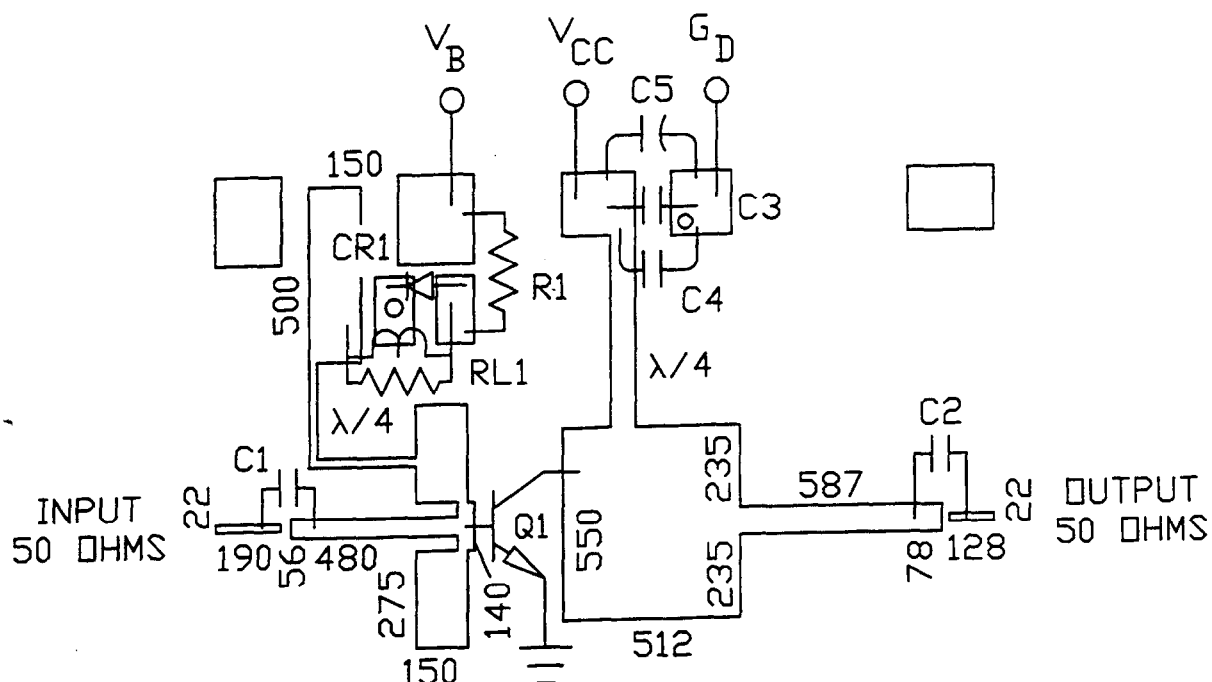
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RF Test Fixture



ARTWORK DIMENSIONS IN MILS

PARTS LIST

C1 C2 C3	33 pF ATC SIZE A
C4	4.7 μ F 35 VOLT CHIP
C5	50 μ F 50 VOLTS
CR1	1N4245 DIODE
Q1	PH1516-10
R1	5 Ω MS 1/4 WATT
RL1	6T/NO. 24 AWG ON 3 Ω HM 1/4 WATT
BOARD TYPE: ROGERS 6010.5 .025" THICK, $E_R = 10.5$	

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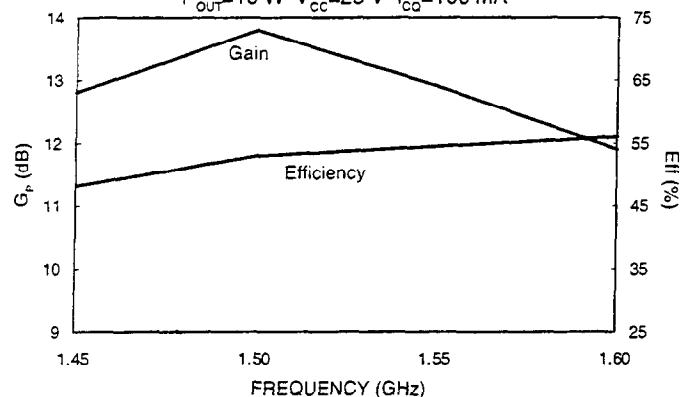
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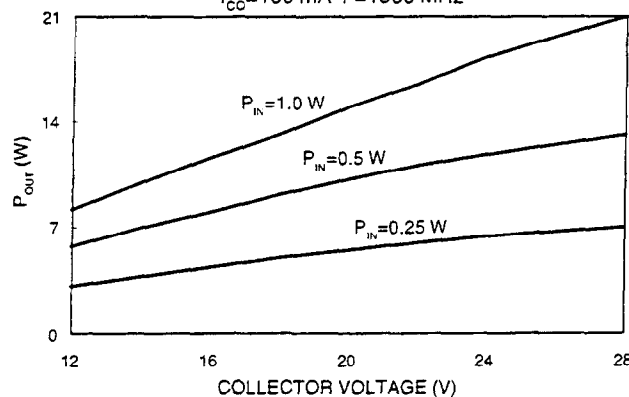
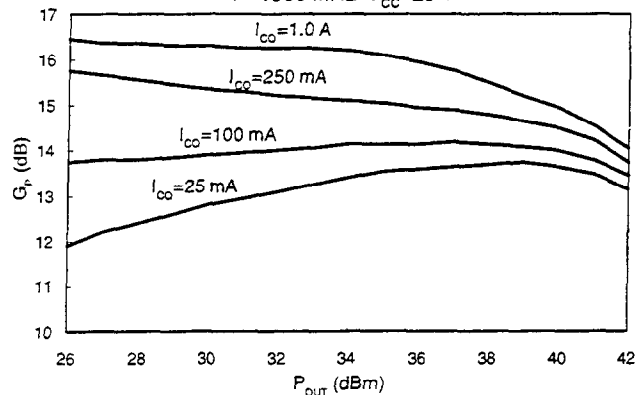
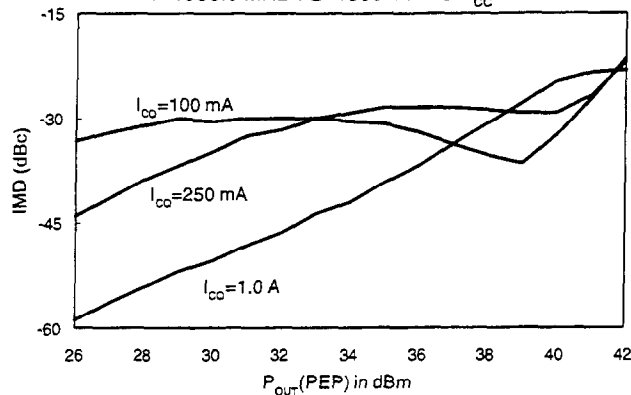
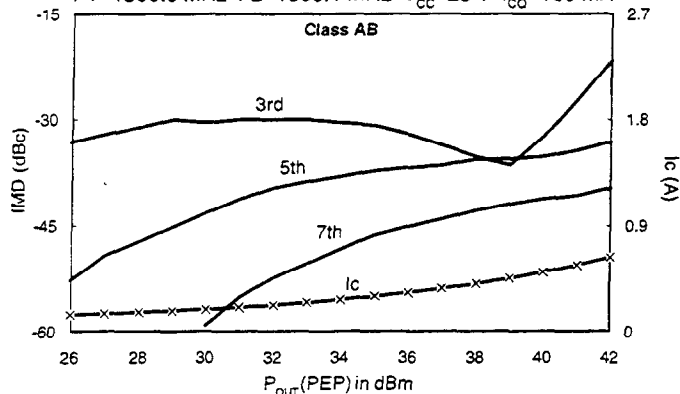
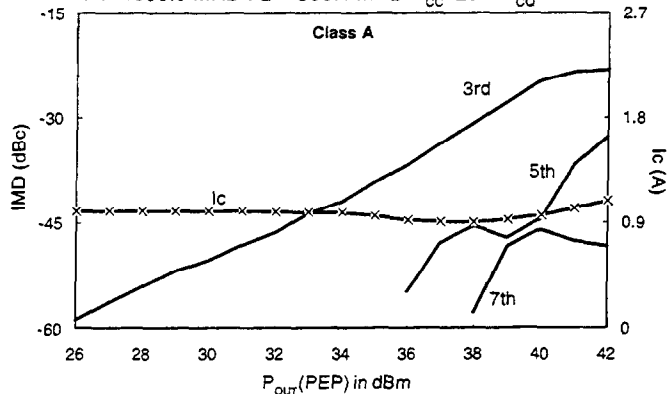
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Typical Broadband Performance Curves

GAIN-EFFICIENCY vs FREQUENCY

 $P_{OUT}=10\text{ W}$ $V_{CC}=25\text{ V}$ $I_{CO}=100\text{ mA}$ 

OUTPUT POWER vs COLLECTOR VOLTAGE

 $I_{CO}=100\text{ mA}$ $F=1500\text{ MHz}$ GAIN vs P_{OUT} $F=1500\text{ MHz}$ $V_{CC}=25\text{ V}$ 3RD ORDER IMD vs P_{OUT} $F1=1500.0\text{ MHz}$ $F2=1500.1\text{ MHz}$ $V_{CC}=25\text{ V}$ IMD vs P_{OUT} $F1=1500.0\text{ MHz}$ $F2=1500.1\text{ MHz}$ $V_{CC}=25\text{ V}$ $I_{CO}=100\text{ mA}$ IMD vs P_{OUT} $F1=1500.0\text{ MHz}$ $F2=1500.1\text{ MHz}$ $V_{CC}=25\text{ V}$ $I_{CO}=1.0\text{ A}$ 

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Typical S-Parameters

 $V_{CC}=25\text{ V}$, $I_{CO}=1.0\text{ A}$

f(MHz)	S11		S21		S12		S22	
	Mag	Phase	Mag	Phase	Mag	Phase	Mag	Phase
100	0.85	177.3	6.57	92.2	0.0066	6.74	0.73	-179.3
200	0.94	179.4	2.96	79.9	0.0073	4.33	0.73	-179.0
300	0.96	-179.4	1.95	75.5	0.0075	4.04	0.72	-178.8
400	0.97	-170.0	1.51	70.6	0.0077	0.91	0.72	-178.2
500	0.97	178.5	1.27	65.2	0.0081	-0.99	0.72	-177.6
600	0.97	178.1	1.12	59.5	0.0085	-2.6	0.73	-177.1
700	0.96	177.7	1.09	52.7	0.0088	-6.8	0.72	-176.1
800	0.97	178.0	0.93	39.5	0.0094	-12.0	0.73	-174.5
900	0.96	177.3	0.88	34.6	0.0093	-13.3	0.75	-173.4
1000	0.97	176.7	0.87	27.8	0.0102	-17.8	0.76	-172.3
1100	0.95	175.9	0.96	20.7	0.0126	-24.5	0.76	-170.1
1200	0.93	176.0	0.93	4.1	0.0118	-40.0	0.81	-169.0
1300	0.92	176.3	0.96	-9.2	0.0118	-51.4	0.86	-168.9
1400	0.91	176.9	0.98	-25.3	0.0120	-68.5	0.91	-169.8
1450	0.91	177.1	0.97	-34.4	0.0118	-79.3	0.94	-171.1
1500	0.91	177.6	0.95	-43.8	0.0117	-91.4	0.97	-172.7
1550	0.91	177.9	0.91	-53.8	0.0114	-104.9	0.98	-174.6
1600	0.92	178.1	0.87	-63.4	0.0107	-119.8	0.99	-176.7
1650	0.92	178.3	0.81	-72.7	0.0094	-135.3	0.99	-178.9
1700	0.93	178.1	0.74	-81.2	0.0094	-146.9	0.01	179.0
1750	0.94	178.0	0.67	-89.1	0.0084	-161.9	0.99	177.4
1800	0.95	177.6	0.61	-96.7	0.0080	-174.5	0.98	175.8
1850	0.95	177.1	0.55	-103.2	0.0079	-172.2	0.96	174.7
1900	0.95	176.7	0.49	-108.6	0.0077	-155.4	0.95	173.8
1950	0.96	176.1	0.44	-113.4	0.0071	145.8	0.94	173.1
2000	0.96	175.6	0.40	-117.3	0.0070	134.9	0.92	172.2
2100	0.96	174.3	0.34	-125.5	0.0081	123.6	0.91	171.0
2200	0.96	173.1	0.28	-133.5	0.0087	104.9	0.84	169.3
2300	0.96	171.7	0.23	-140.0	0.0092	89.0	0.88	168.7
2400	0.96	170.5	0.20	-144.5	0.0075	80.1	0.86	168.0

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