PF0310

MOS FET Power Amplifier Module for VHF Band

HITACHI

ADE-208-103B (Z)
3rd Edition
July 1996

Application

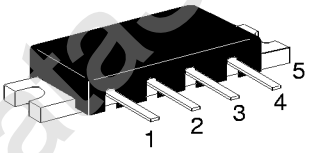
VHF Band 136 to 150 MHz

Features

- Small package: 30 × 10 × 5.9 mm
- High efficiency: 55% Typ
- Low power control current: 0.5 mA Max

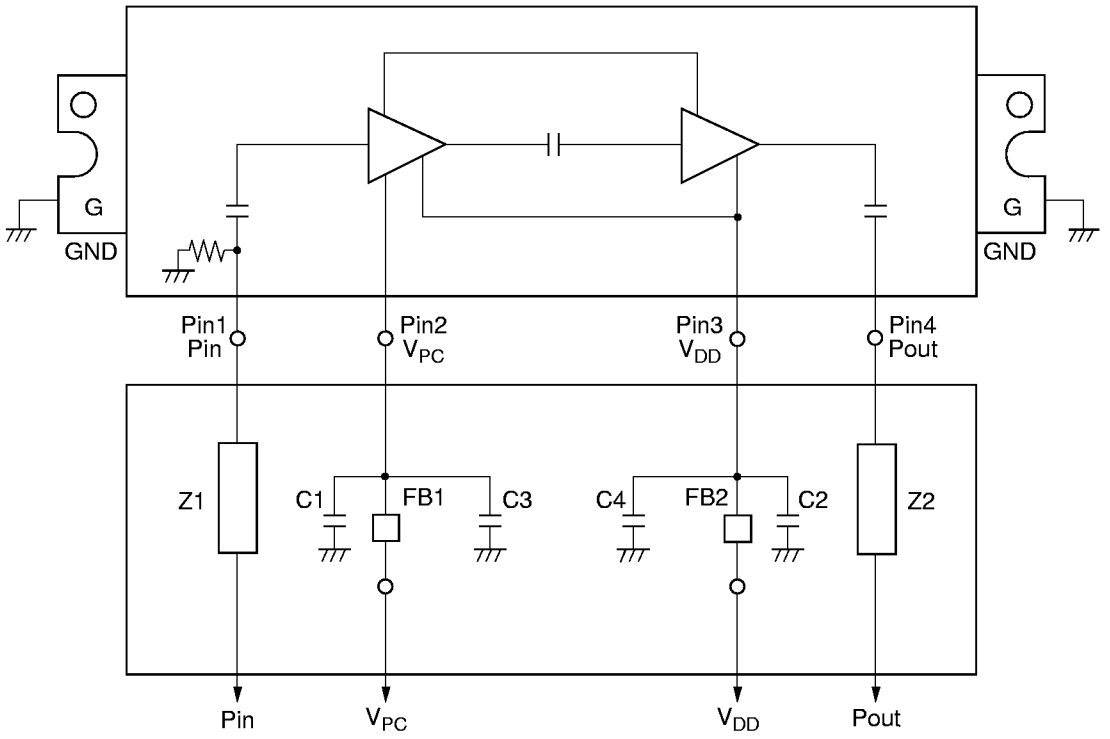
Pin Arrangement

• RF-J



1: Pin
2: V_{PC}
3: V_{DD}
4: Pout
5: GND (Flange)

Internal Diagram and External Circuit



C1 = C2 = 0.01 μF (Ceramic chip capacitor)
C3 = C4 = 10 μF (Aluminum Electrolyte Capacitor)
FB = Ferrite bead BL01RN1-A62-001 (Manufacture: MURATA) or equivalent
Z1 = Z2 = 50 Ω (Microstrip line)

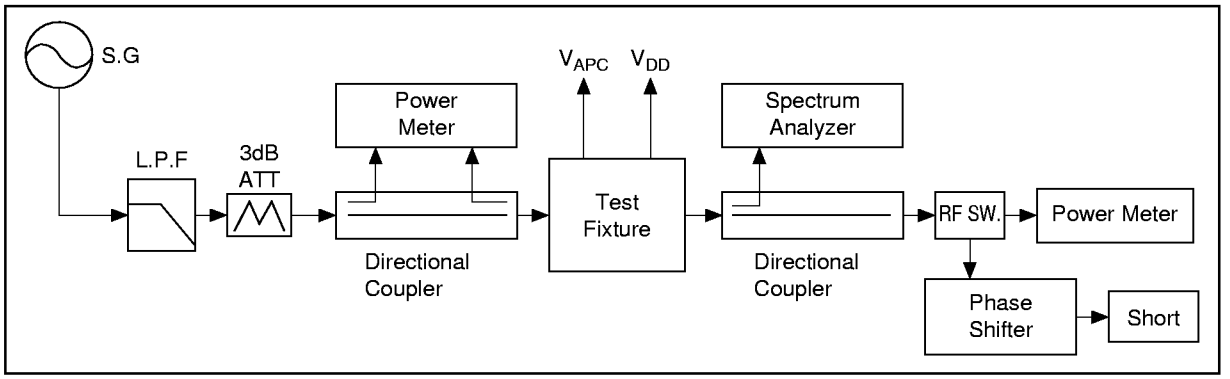
Absolute Maximum Ratings (Tc = 25°C)

Item	Symbol	Rating	Unit
Supply voltage	V_{DD}	17	V
Supply current	I_{DD}	3	A
PC voltage	V_{PC}	7	V
Input power	Pin	100	mW
Operating case temperature	Tc (op)	–30 to +100	°C
Storage temperature	Tstg	–40 to +110	°C

Electrical Characteristics (Tc = 25°C)

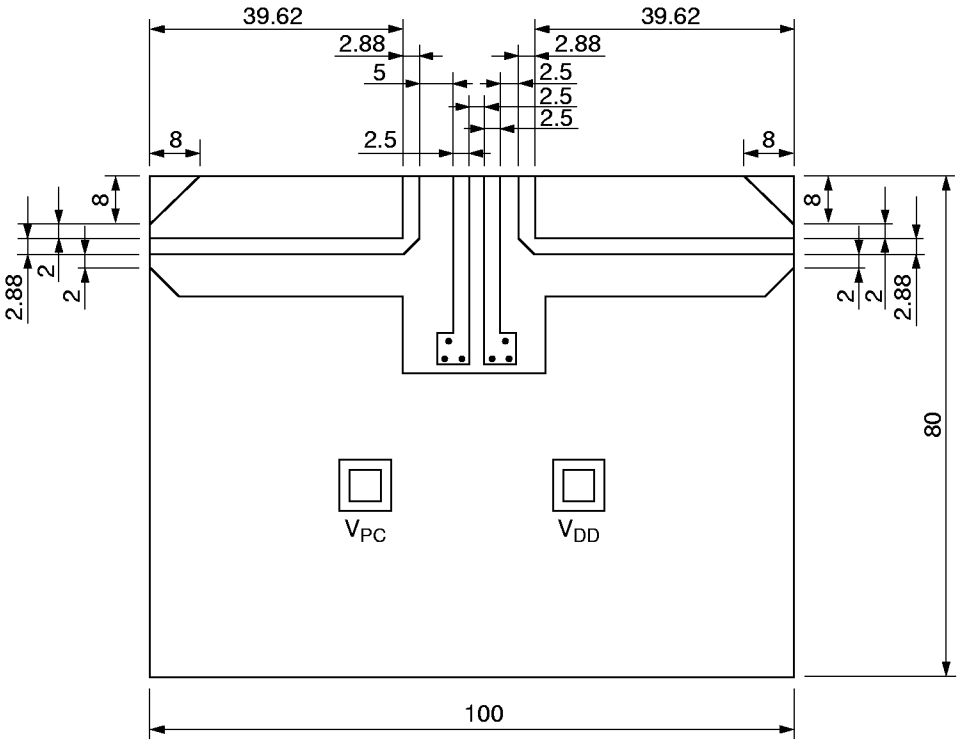
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Frequency range	f	136	—	150	MHz	—
Drain cutoff current	I_{DS}	—	—	100	μA	V_{DD} = 17 V, V_{PC} = 0 V, R_L = Rg = 50 Ω
Total efficiency	η_T	45	55	—	%	Pin = 20 mW, V_{DD} = 9.6 V, Pout = 7 W (at V_{APC} controlled), R_L = Rg = 50 Ω, Tc = 25°C
2nd harmonic distortion	2nd H.D.	—	–25	–20	dBc	
3rd harmonic distortion	3rd H.D.	—	–35	–30	dBc	
4th harmonic distortion	4th H.D.	—	–40	–30	dBc	
Input VSWR	VSWR (in)	—	1.5	3	—	
Output power (1)	Pout (1)	7	8	—	W	Pin = 20 mW, V_{DD} = 9.6 V, V_{PC} = 6 V, R_L = Rg = 50 Ω
Output power (2)	Pout (2)	2.5	3	—	W	Pin = 20 mW, V_{DD} = 6 V, V_{PC} = 5.5 V, R_L = Rg = 50 Ω
Load VSWR tolerance	—	No degradation			—	Pin = 20 mW, V_{DD} = 15 V, Pout ≤ 7 W, (V_{PC} controlled), Output VSWR = 6:1 All phases
Stability	—	No parasitic oscillation			—	Pin = 20 mW, V_{DD} = 6 to 15 V, Pout ≤ 7 W, (V_{PC} controlled), Output VSWR = 3:1 All phases

Test System Diagram



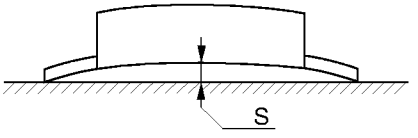
Test Fixture Pattern

Unit: mm



Grass Epoxy Double sided P.C.B
(t=1.6 mm, εr=4.8)

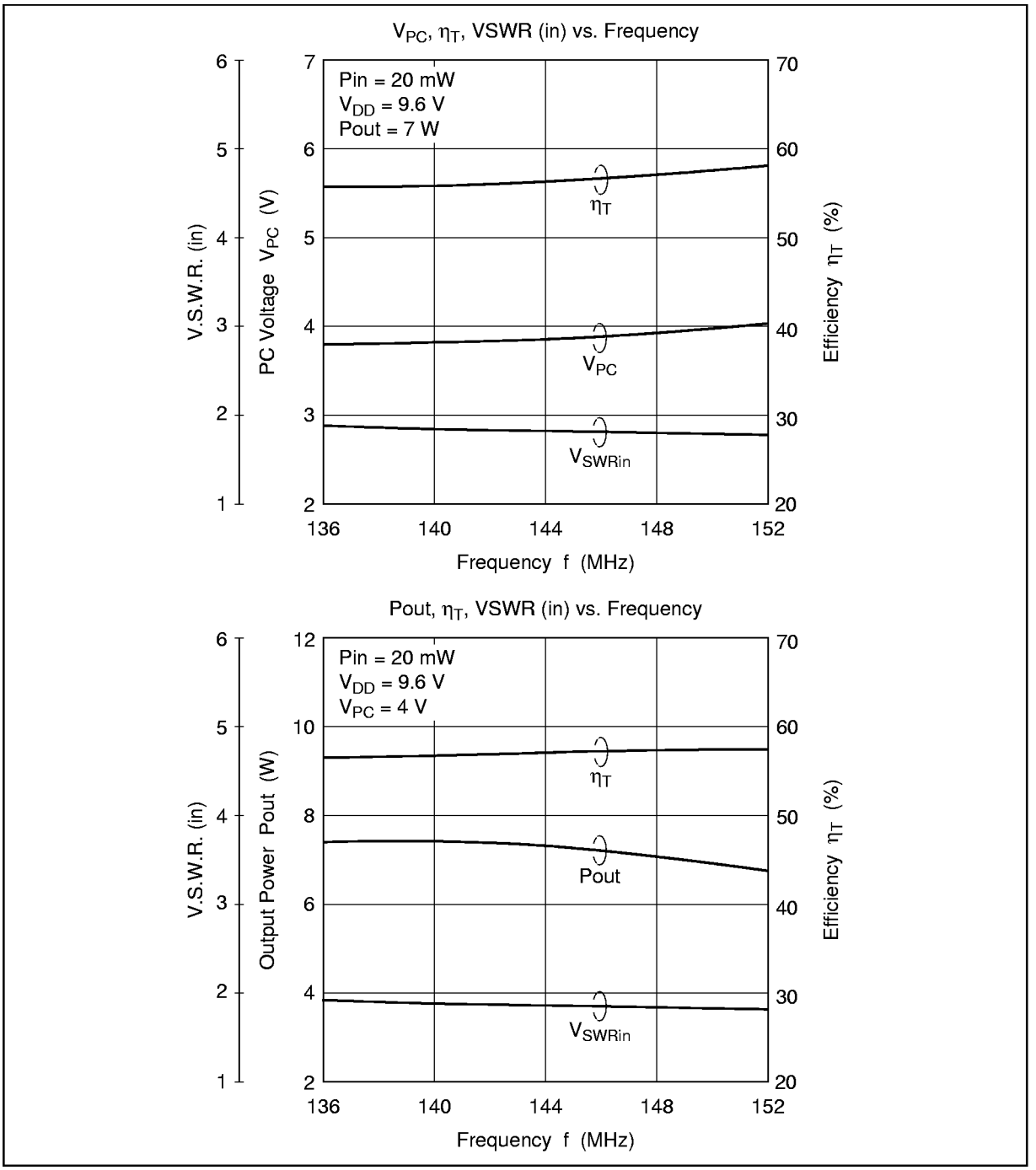
Mechanical Characteristics

Item	Measuring Conditions	Spec
Torque for screw up the heatsink flange	M2.6 Screw Bolts	1.5 to 3.5 kg•cm
Warp size of the heatsink flange: S		S = 0 +0.1/–0 mm

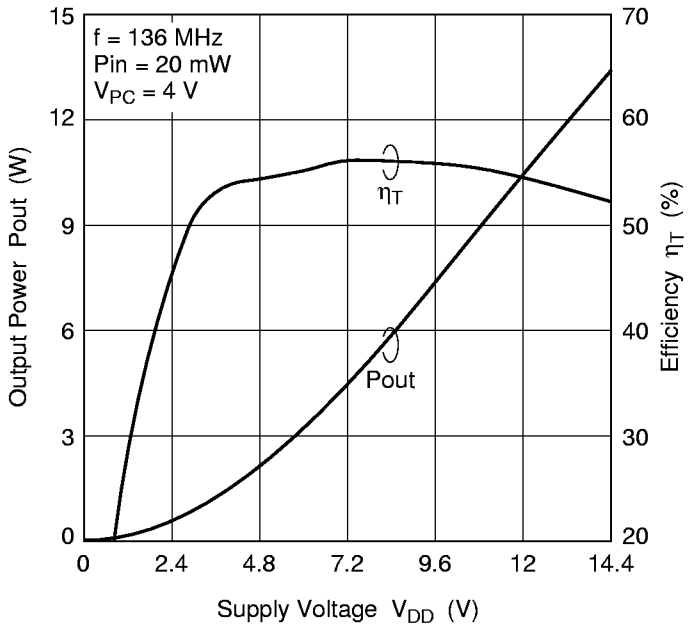
Note for Use

- Unevenness and distortion at the surface of the heatsink attached module should be less than 0.05 mm.
- It should not be existed any dust between module and heatsink.
- Torque for screw up the heatsink flange should be 1.5 to 3.5 kg · cm with M2.6 screw bolts.
- Don't solder the flange directly.
- Soldering temperature and soldering time should be less than 230°C, 10 sec.
  (Soldering position spaced from the root point of the lead frame: 2 mm).
- It should not be given mechanical and thermal stress to lead and flange of the module.
- To protect devices from electro-static damage, soldering iron, measuring-equipment and human body etc. should be grounded.
- Don't washing the module except lead pins.
- When the external parts (Isolator, Duplexer, etc.) of the module are changed, the electrical characteristics should be evaluated enough.
- To get good stability, ground impedance between the module GND flange and PCB GND pattern should be designed as low as possible.

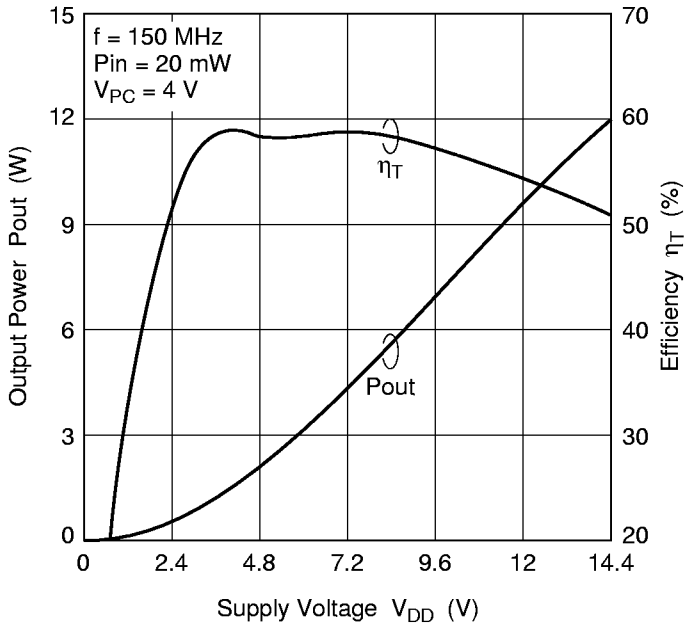
Characteristic Curves



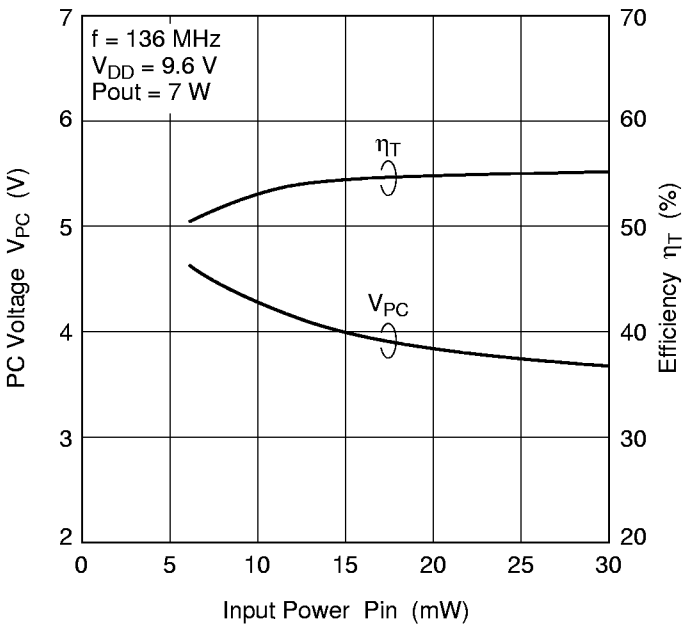
Pout, η_T vs. V_{DD} (1)



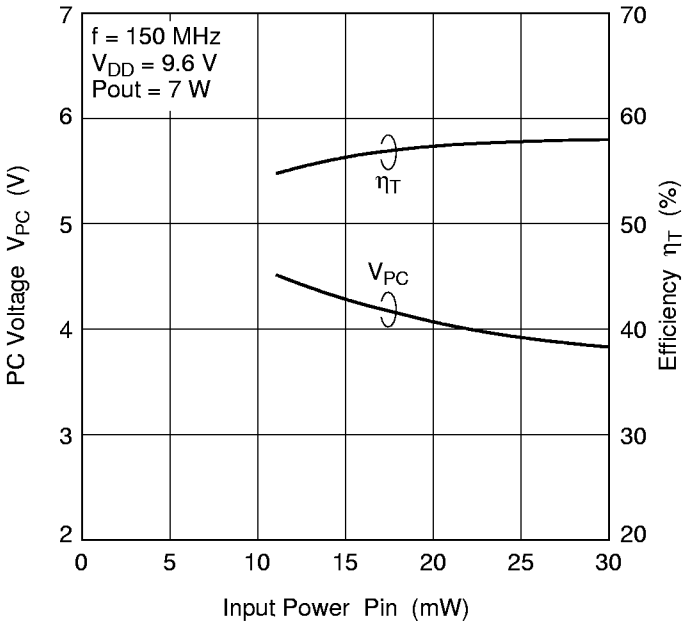
Pout, η_T vs. V_{DD} (2)



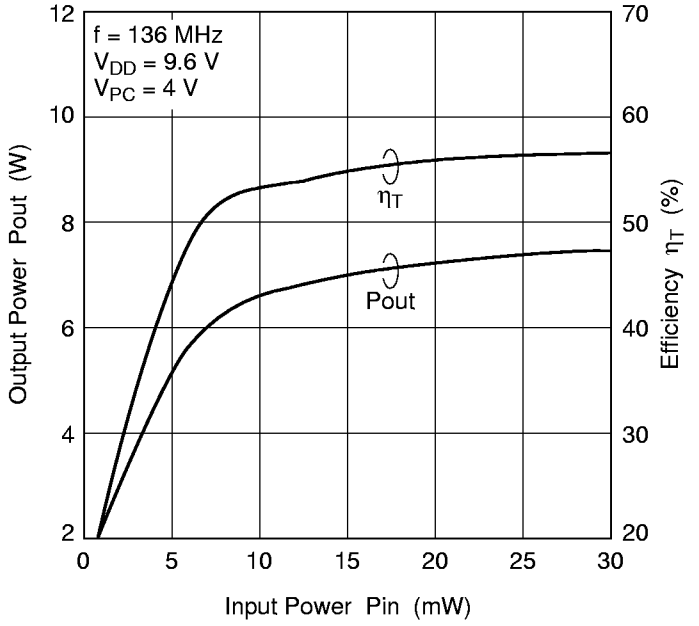
V_{PC}, η_T vs. Pin (1)



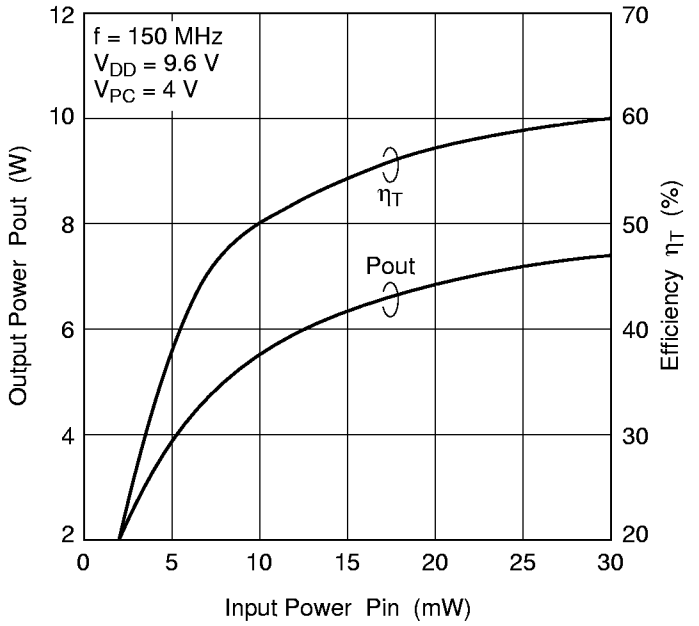
V_{PC}, η_T vs. Pin (2)



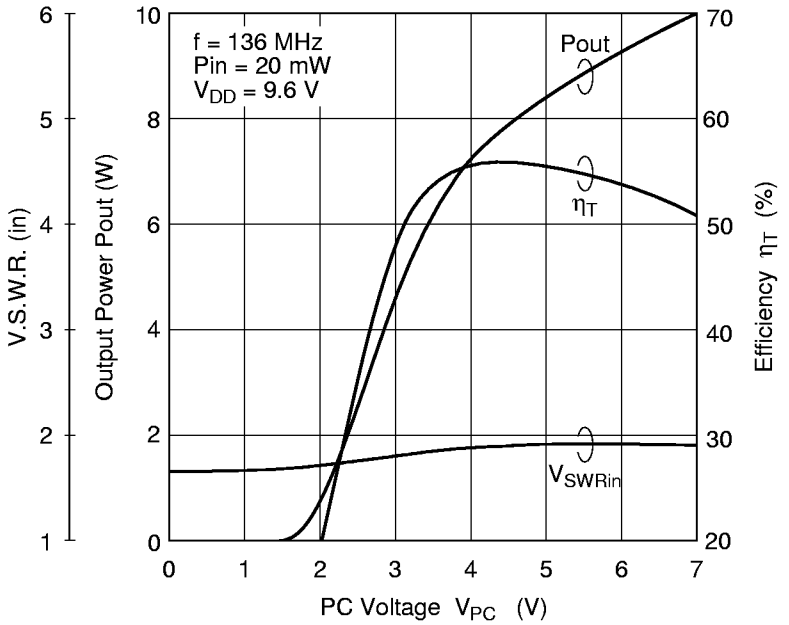
Pout, η_T vs. Pin (1)



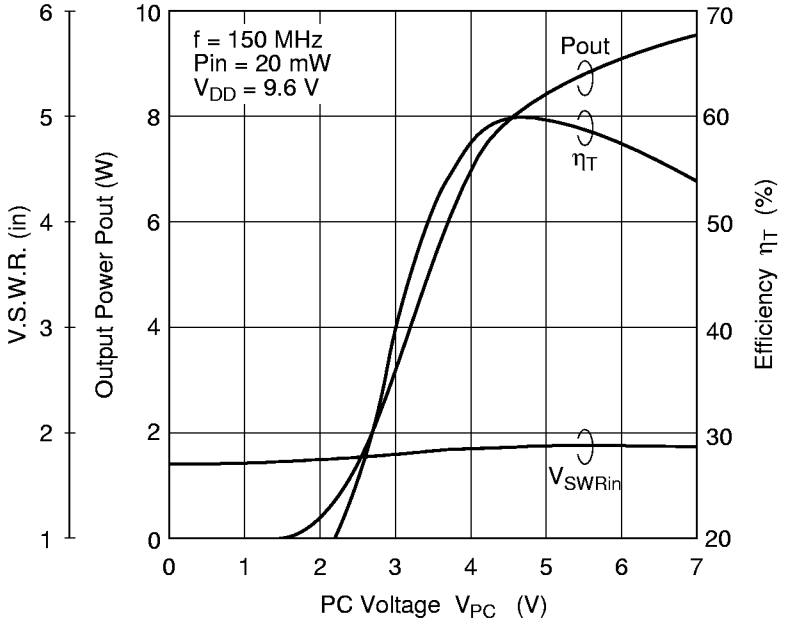
Pout, η_T vs. Pin (2)



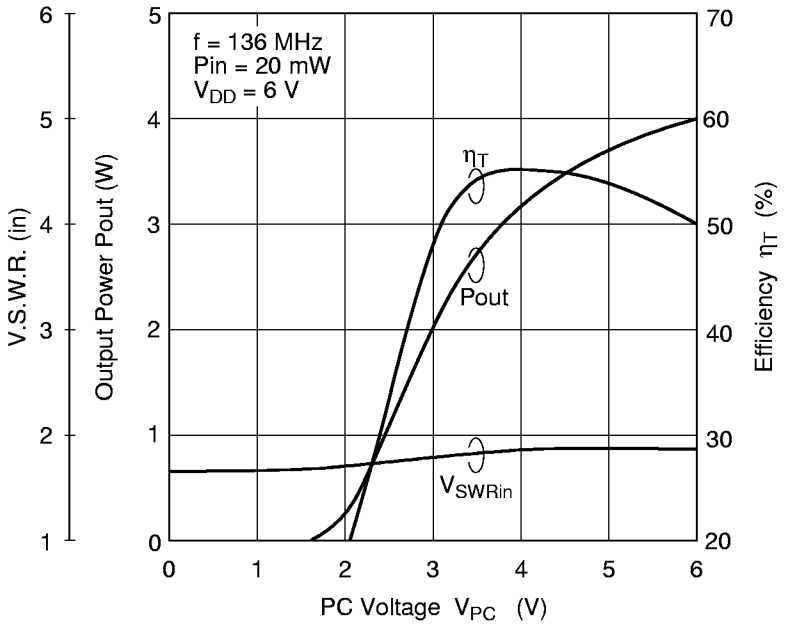
Pout, η_T, VSWR (in) vs. V_{PC} (1)



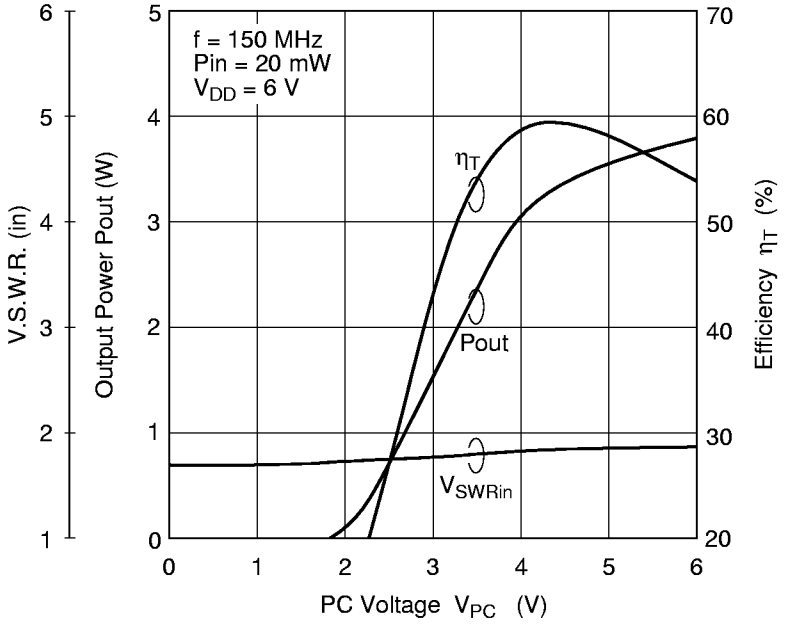
Pout, η_T, VSWR (in) vs. V_{PC} (2)



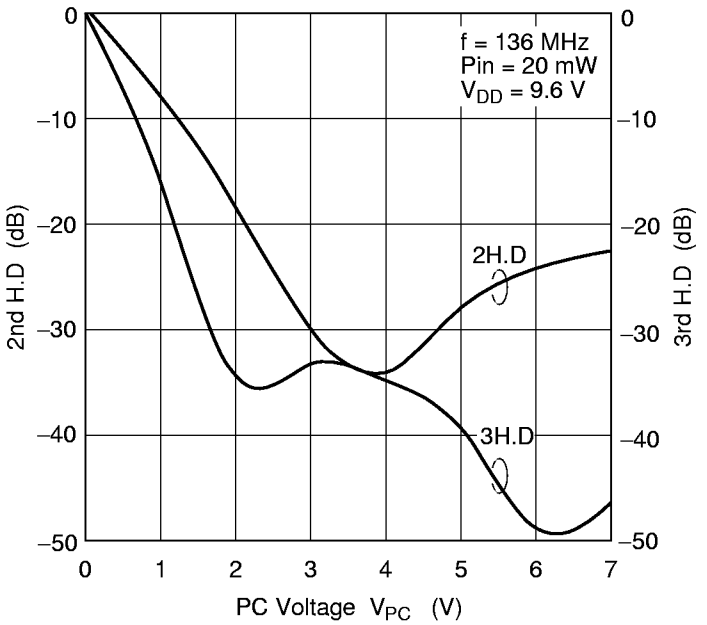
Pout, η_T, VSWR (in) vs. V_{PC} (3)



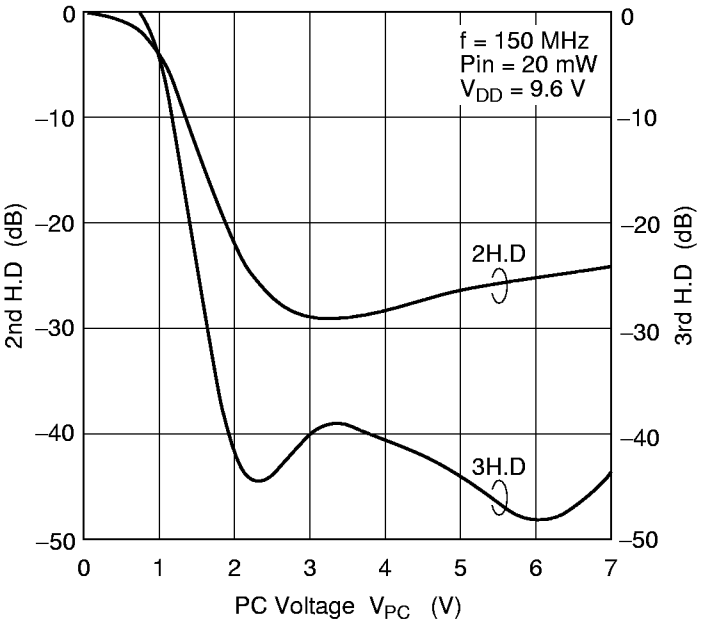
Pout, η_T, VSWR (in) vs. V_{PC} (4)



2nd H.D, 3rd H.D vs. V_{PC} (1)

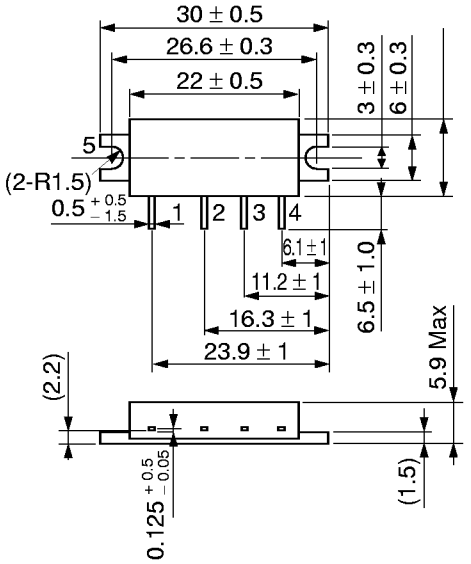


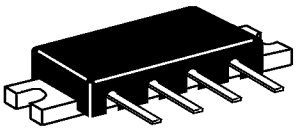
2nd H.D, 3rd H.D vs. V_{PC} (2)



Package Dimensions

Unit: mm





Hitachi Code	RF-J
JEDEC	—
EIAJ	—
Weight (reference value)	—