PF0030 Series

MOS FET Power Amplifier

HITACHI

ADE-208-460 (Z)
1st. Edition
July 1996

Features

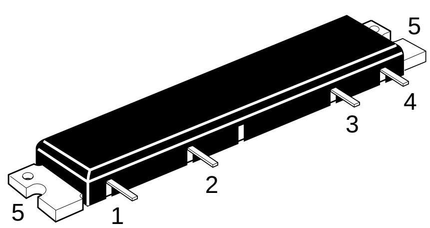
- High stability: Load VSWR = 20 : 1
- Low power control current: 400 µA
- Thin package: 5 mmt

Ordering Information

Type No	Operating Frequency	Application
PF0030	824 to 849 MHz	AMPS
PF0032	872 to 905 MHz	E-TACS

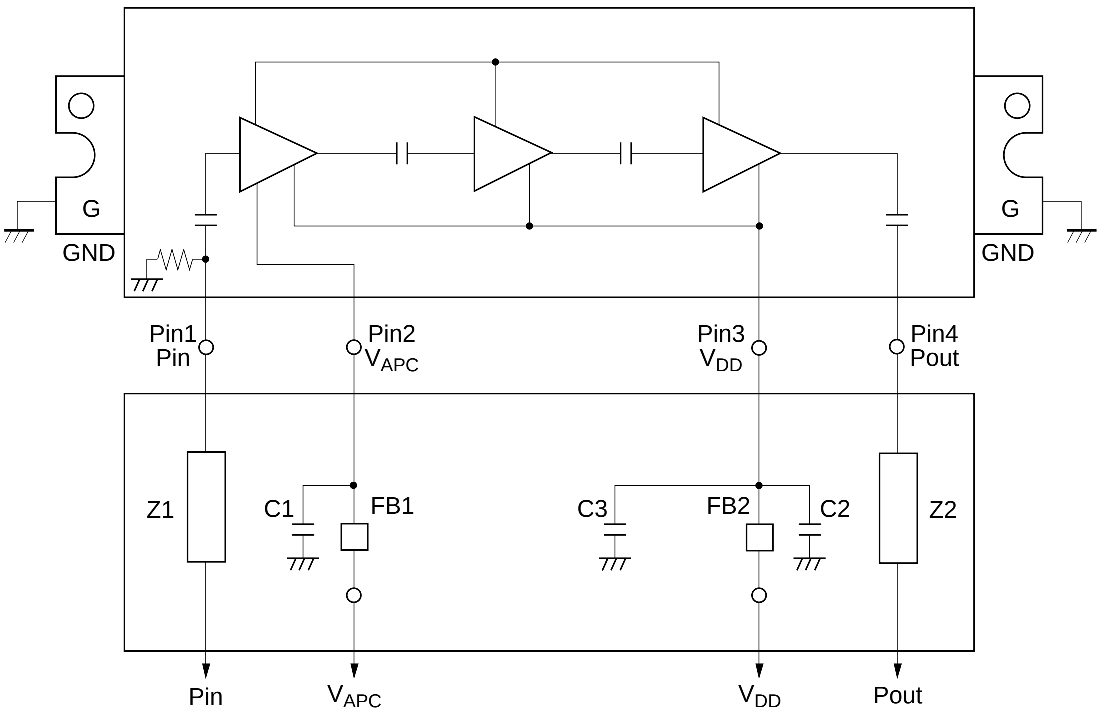
Pin Arrangement

• RF-B2



1: Pin
2: V_{APC}
3: V_{DD}
4: Pout
5: GND

Internal Diagram and External Circuit



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

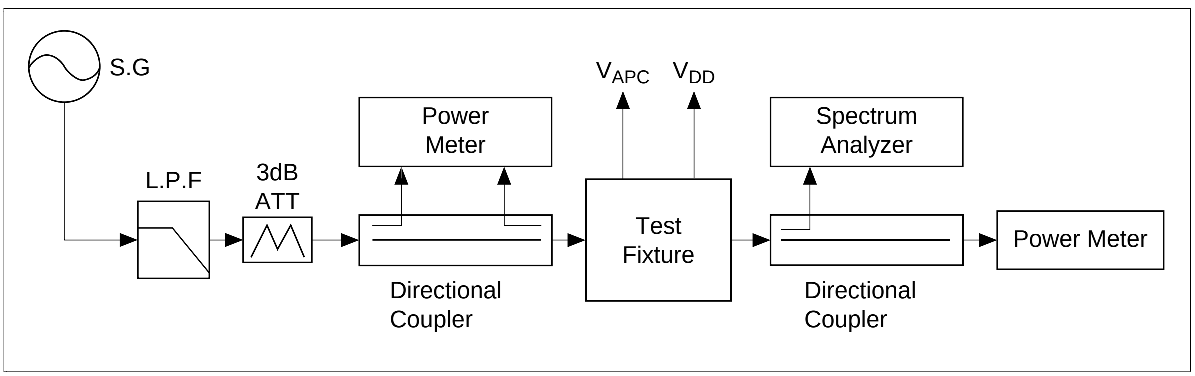
Absolute Maximum Ratings (Ta = 25°C)

Item	Symbol	Rating	Unit
Supply voltage	V_{DD}	17	V
Supply current	I_{DD}	3	A
APC voltage	V_{APC}	±8	V
Input power	Pin	20	mW
Operating case temperature	Tc (op)	–30 to +110	°C
Storage temperature	Tstg	–40 to +110	°C

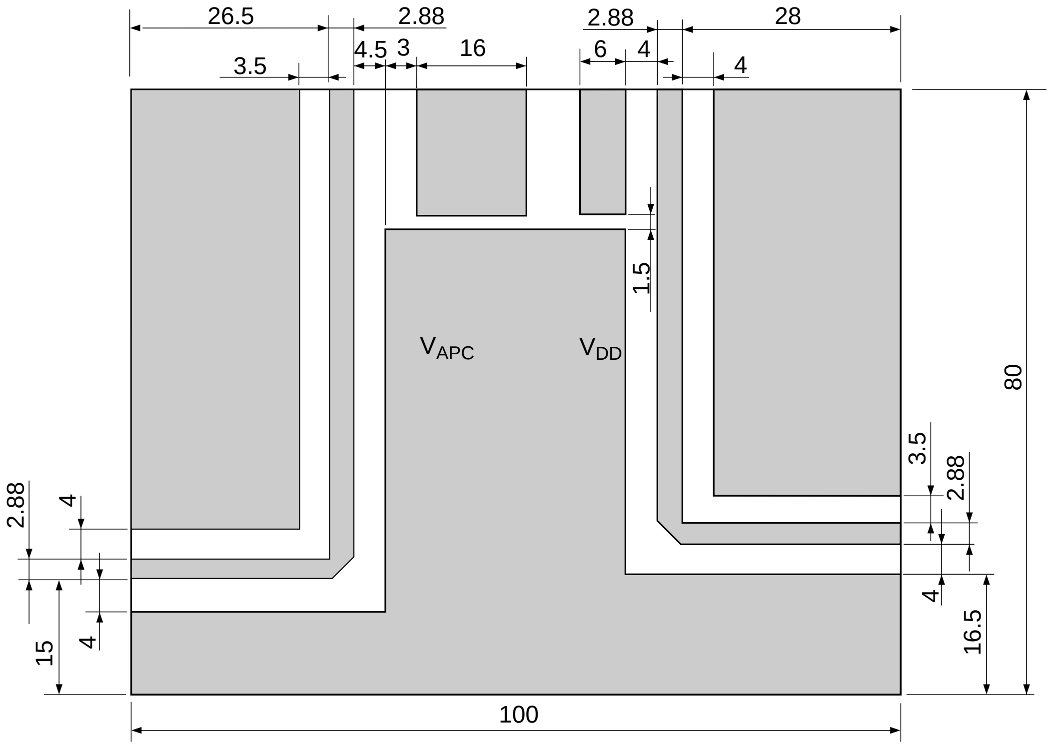
Electrical Characteristics (Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Drain cutoff current	I_{DS}	—	—	500	µA	V_{DD} = 17 V, V_{APC} = 0 V
Total efficiency	η_T	35	40	—	%	Pin = 2 mW,
2nd harmonic distortion	2nd H.D.	—	–50	–30	dB	V_{DD} = 12.5 V,
3rd harmonic distortion	3rd H.D.	—	–50	–30	dB	Pout = 6 W (at APC controlled)
Input VSWR	VSWR (in)	—	1.5	3	—	Zin = Zout = 50 Ω
Output VSWR	VSWR (out)	—	1.5	—	—	
Stability	—	No parasitic oscillation			—	Pin = 2 mW, V_{DD} = 12.5 V, Pout = 6 W (at APC controlled), Zin = 50 Ω, Output VSWR = 20:1 All phases, t = 20 sec

Test System Diagram

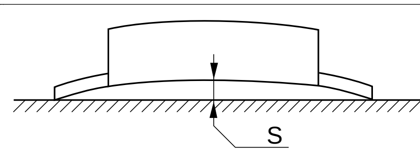


Test Fixture Pattern/ Unit: mm



Grass Epoxy Double sided PCB
(t = 1.6 mm, εr = 4.8)

Mechanical Characteristics

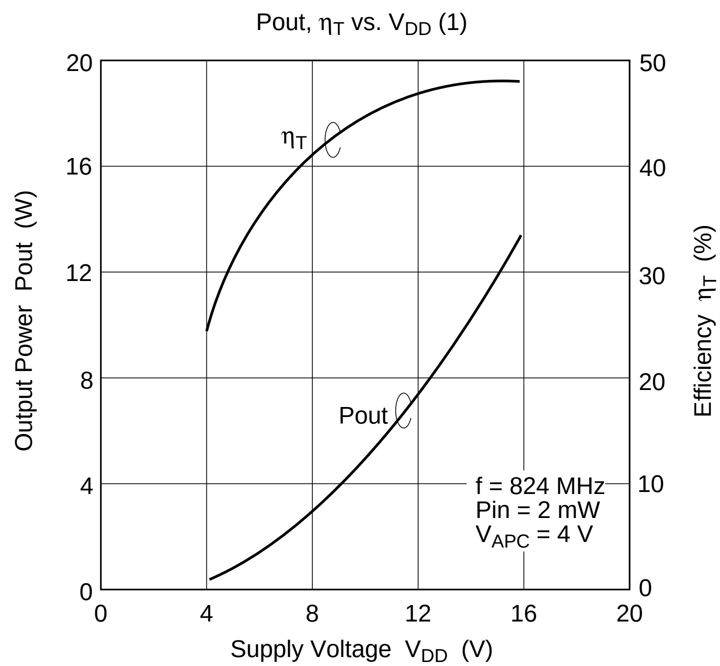
Item	Conditions	Spec
Torque for screw up the heatsink flange	M3 Screw Bolts	4 to 6 kg•cm
Warp size of the heatsink flange: S		S = 0 +0.3/–0 mm

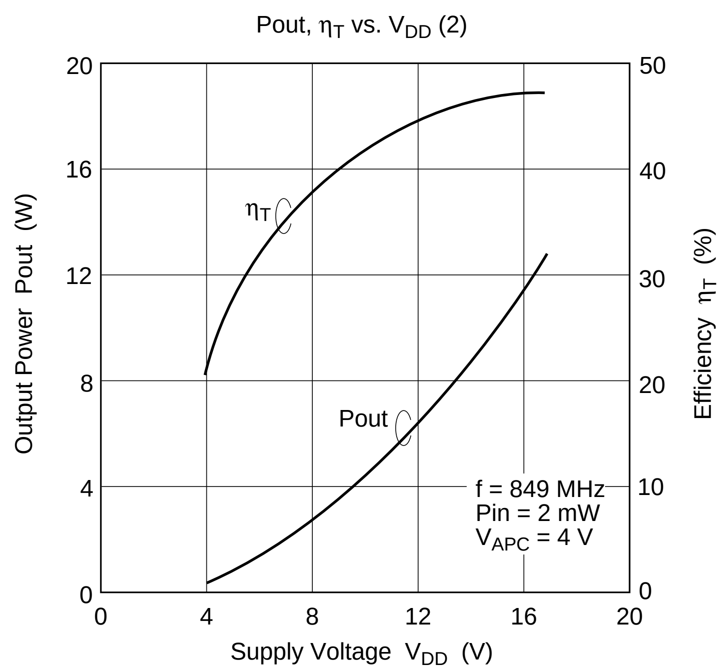
Note for Use

- 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.
- MODULE should be separated from PCB less than 1.5 mm.
- 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)
- Recommendation of thermal joint compounds is TYPE G746.
  (Manufacturer: Shin-Etsu Chemical, Co., Ltd.)
- To protect devices from electro-static damage, soldering iron, measuring-equipment and human body etc. should be grounded.
- Torque for screw up the heatsink flange should be 4 to 6 kg · cm with M3 screw bolts.
- Don’t solder the flange directly.
- It should make the lead frame as straight as possible.
- The module should be screwed up before lead soldering.
- It should not be given mechanical and thermal stress to lead and flange of the module.
- When the external parts (Isolator, Duplexer, etc.) of the module are changed, the electrical characteristics should be evaluated enough.
- Don’t washing the module except lead pins.
- To get good stability, ground impedance between the module GND flange and PCB GND pattern should be designed as low as possible.

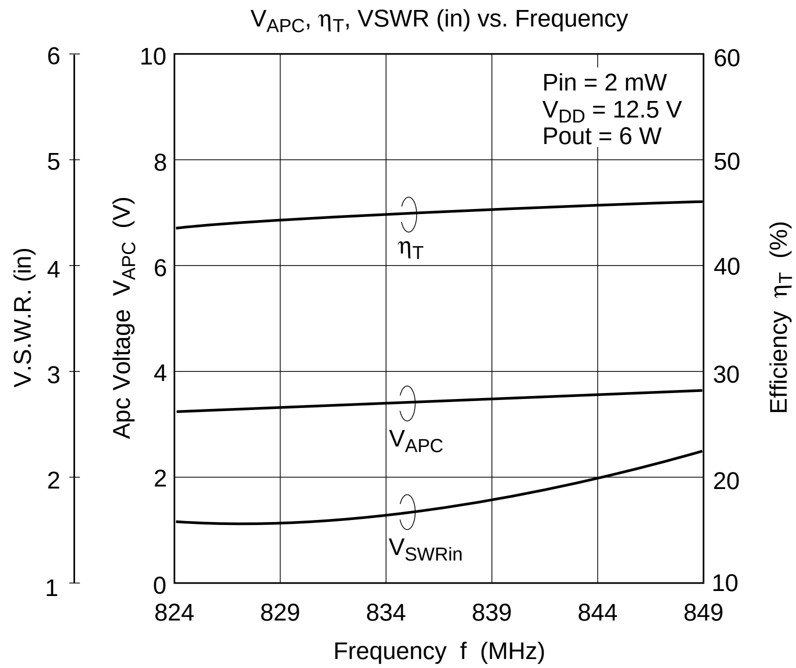
Characteristics Curve

PF0030

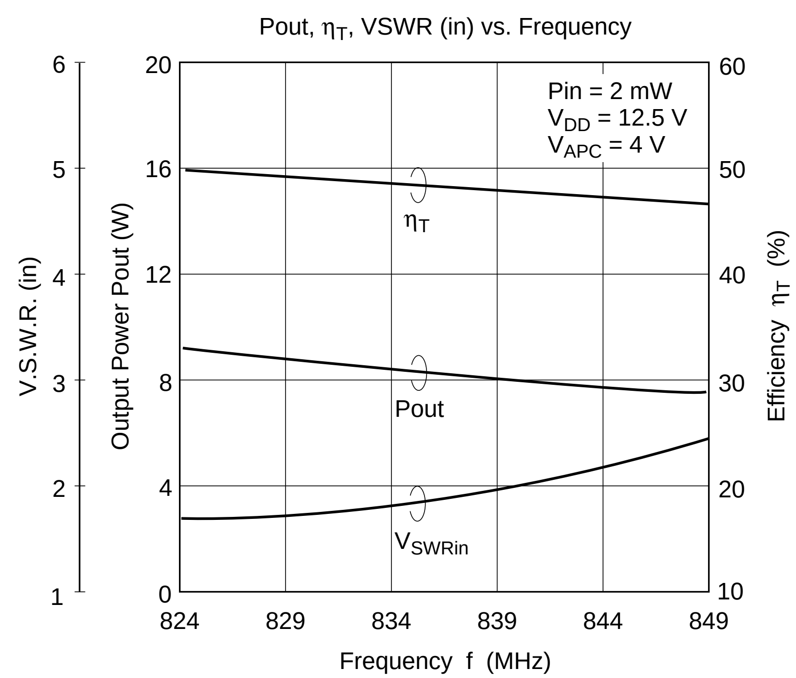




PF0030 (cont)

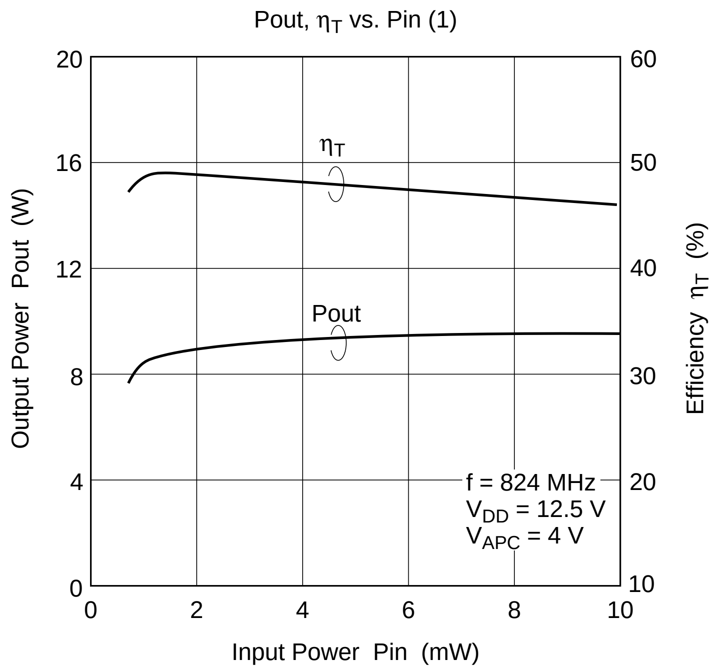


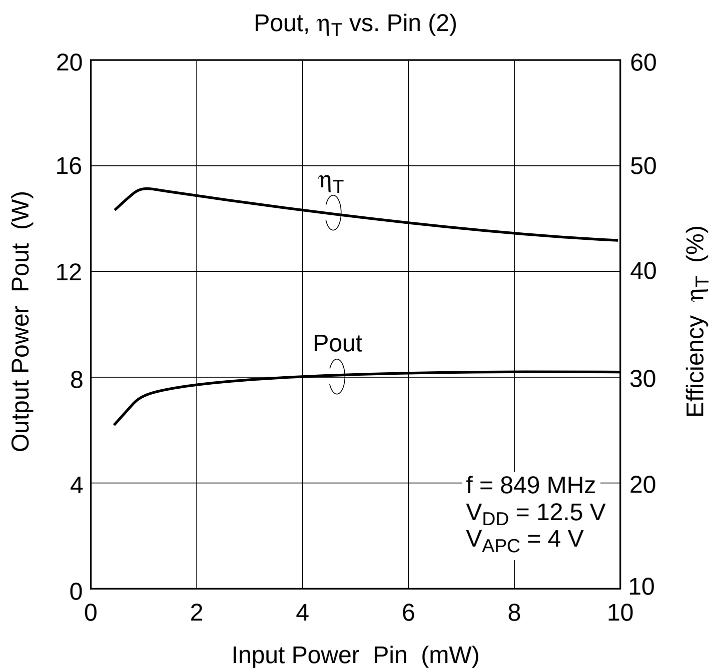
V_{APC}, η_T, VSWR (in) vs. Frequency
Pin = 2 mW
V_{DD} = 12.5 V
Pout = 6 W
η_T
V_{APC}
V_{SWRin}
V.S.W.R. (in)
Apc Voltage V_{APC} (V)
Efficiency η_T (%)
Frequency f (MHz)
824
829
834
839
844
849



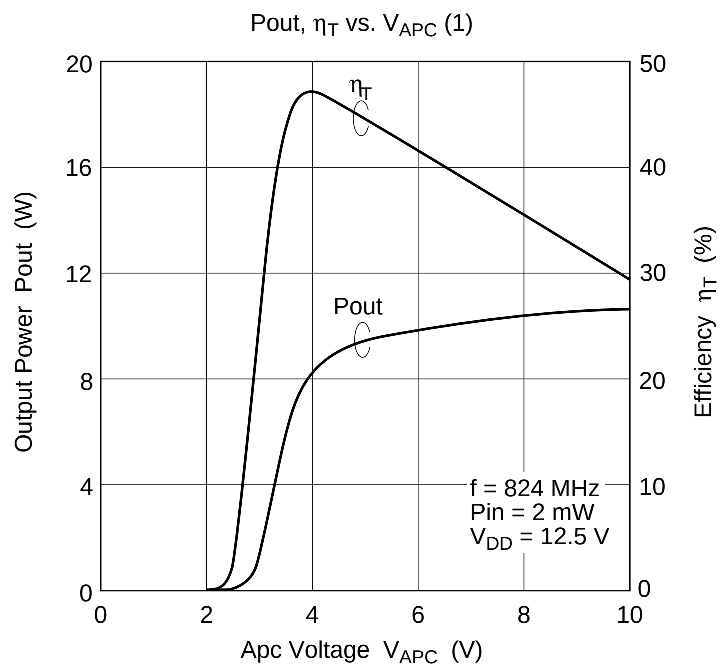
Pout, η_T, VSWR (in) vs. Frequency
Pin = 2 mW
V_{DD} = 12.5 V
V_{APC} = 4 V
η_T
Pout
V_{SWRin}
V.S.W.R. (in)
Output Power Pout (W)
Efficiency η_T (%)
Frequency f (MHz)
824
829
834
839
844
849

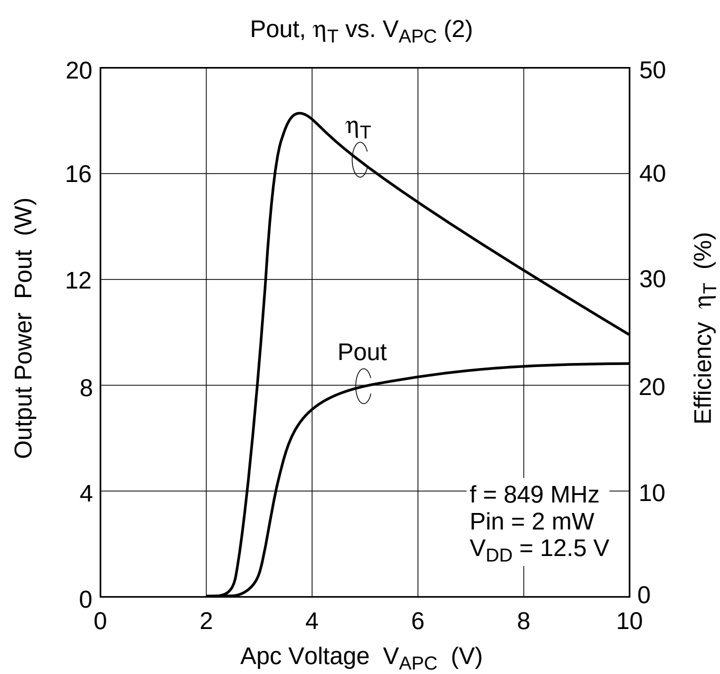
PF0030 (cont)


Pout, η_T vs. Pin (1)
η_T
Pout
f = 824 MHz
V_{DD} = 12.5 V
V_{APC} = 4 V
Output Power Pout (W)
Efficiency η_T (%)
Input Power Pin (mW)
0
4
8
12
16
20
10
20
30
40
50
60
0
2
4
6
8
10

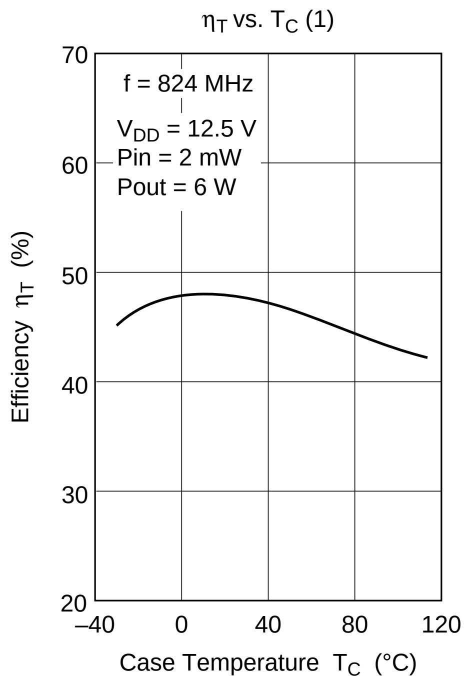

Pout, η_T vs. Pin (2)
η_T
Pout
f = 849 MHz
V_{DD} = 12.5 V
V_{APC} = 4 V
Output Power Pout (W)
Efficiency η_T (%)
Input Power Pin (mW)
0
4
8
12
16
20
10
20
30
40
50
60
0
2
4
6
8
10

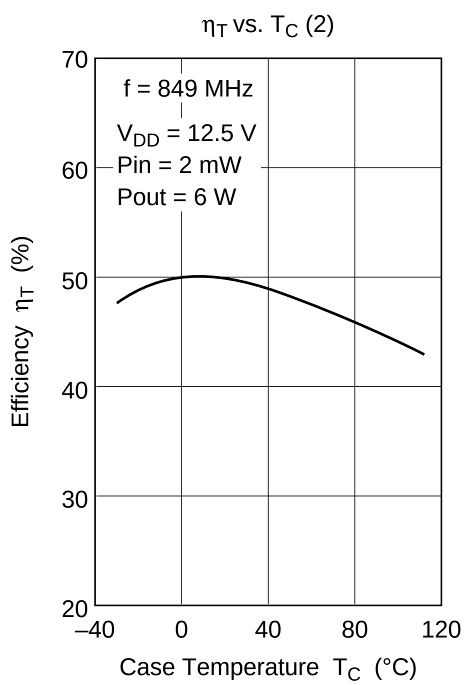
PF0030 (cont)


Pout, ηT vs. VAPC (1)
ηT
Pout
f = 824 MHz
Pin = 2 mW
VDD = 12.5 V
Output Power Pout (W)
Efficiency ηT (%)
Apc Voltage VAPC (V)
0
4
8
12
16
20
0
10
20
30
40
50
0
2
4
6
8
10

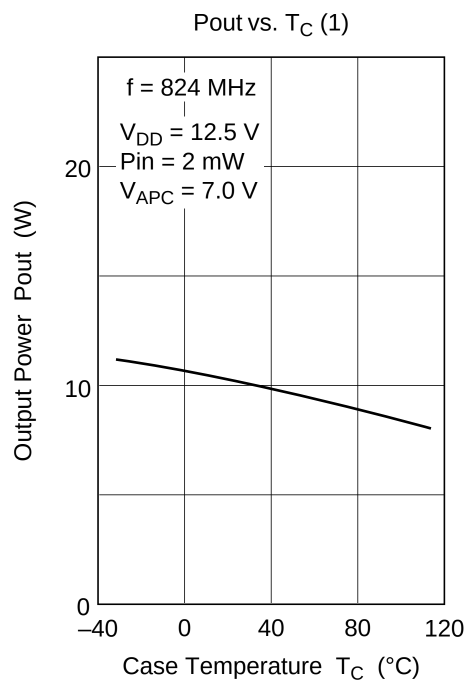

Pout, ηT vs. VAPC (2)
ηT
Pout
f = 849 MHz
Pin = 2 mW
VDD = 12.5 V
Output Power Pout (W)
Efficiency ηT (%)
Apc Voltage VAPC (V)
0
4
8
12
16
20
0
10
20
30
40
50
0
2
4
6
8
10

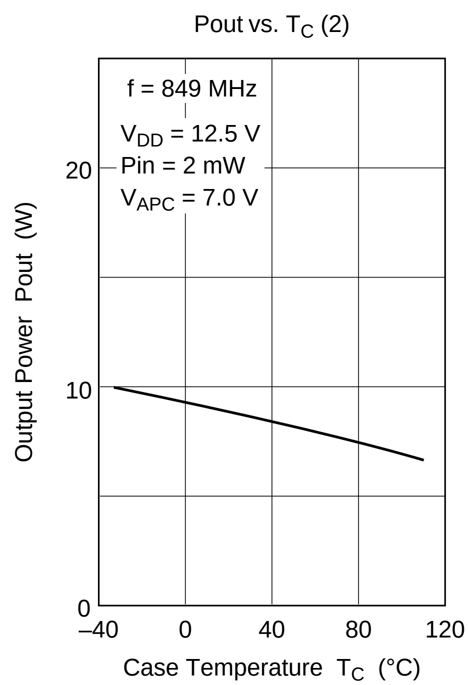
PF0030 (cont)


ηT vs. TC (1)
f = 824 MHz
VDD = 12.5 V
Pin = 2 mW
Pout = 6 W
Efficiency ηT (%)
70
60
50
40
30
20
–40
0
40
80
120
Case Temperature TC (°C)


ηT vs. TC (2)
f = 849 MHz
VDD = 12.5 V
Pin = 2 mW
Pout = 6 W
Efficiency ηT (%)
70
60
50
40
30
20
–40
0
40
80
120
Case Temperature TC (°C)

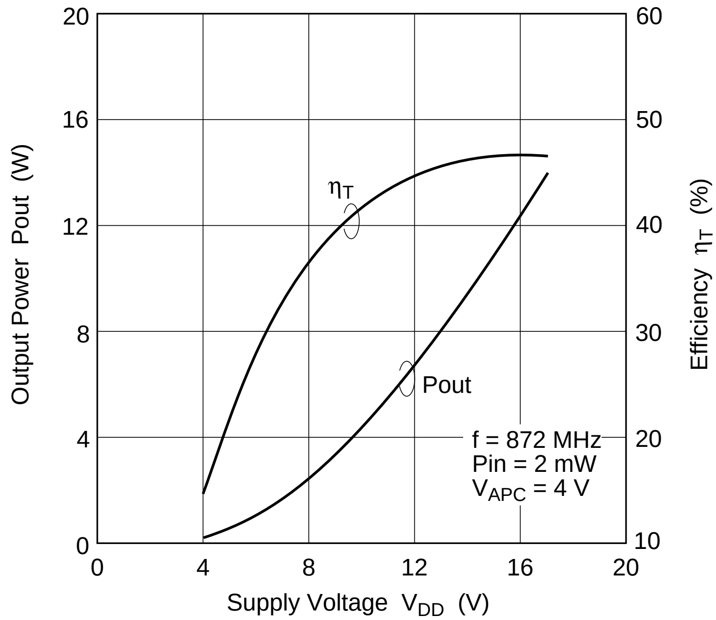
PF0030 (cont)


Pout vs. T_C (1)
f = 824 MHz
V_{DD} = 12.5 V
Pin = 2 mW
V_{APC} = 7.0 V
Output Power Pout (W)
Case Temperature T_C (°C)
20
10
0
–40
0
40
80
120

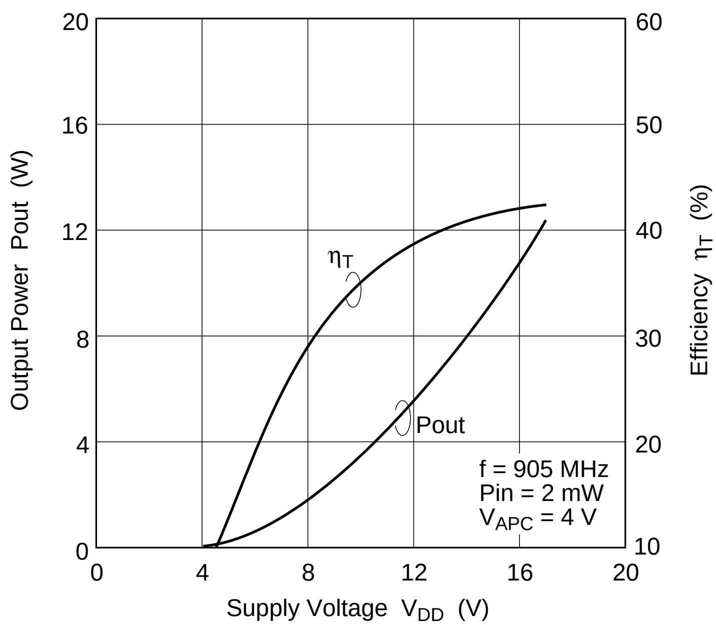

Pout vs. T_C (2)
f = 849 MHz
V_{DD} = 12.5 V
Pin = 2 mW
V_{APC} = 7.0 V
Output Power Pout (W)
Case Temperature T_C (°C)
20
10
0
–40
0
40
80
120

PF0032

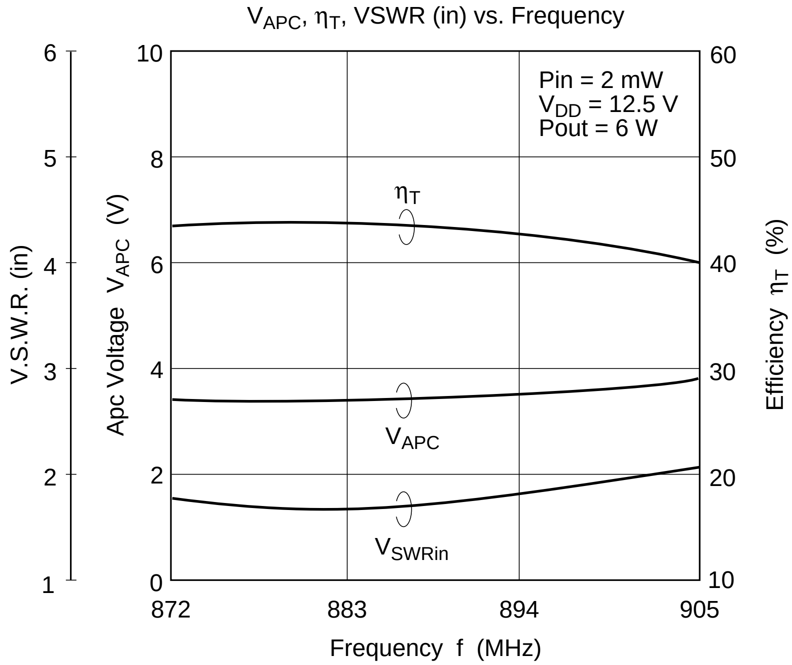
Pout, η_T vs. V_{DD} (1)



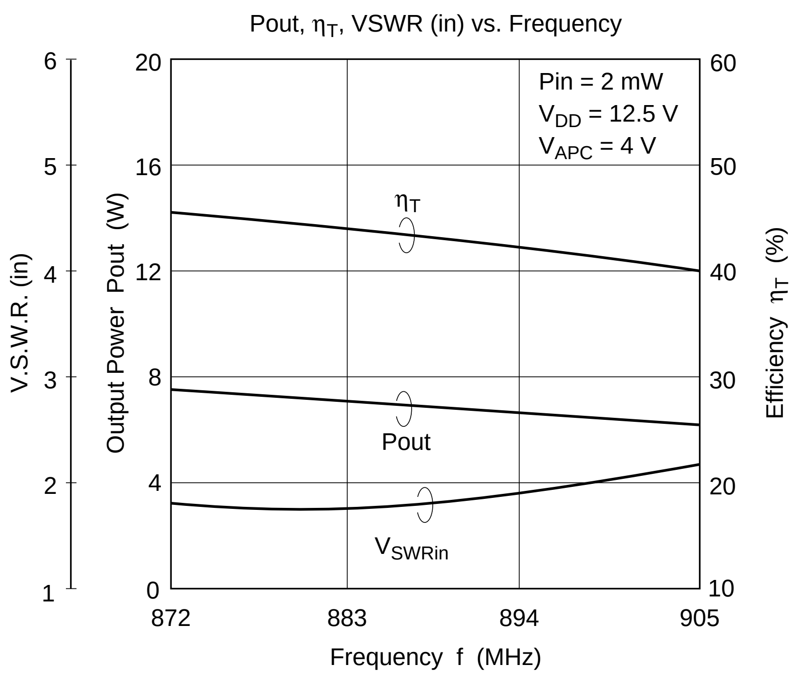
Pout, η_T vs. V_{DD} (2)



PF0032 (cont)

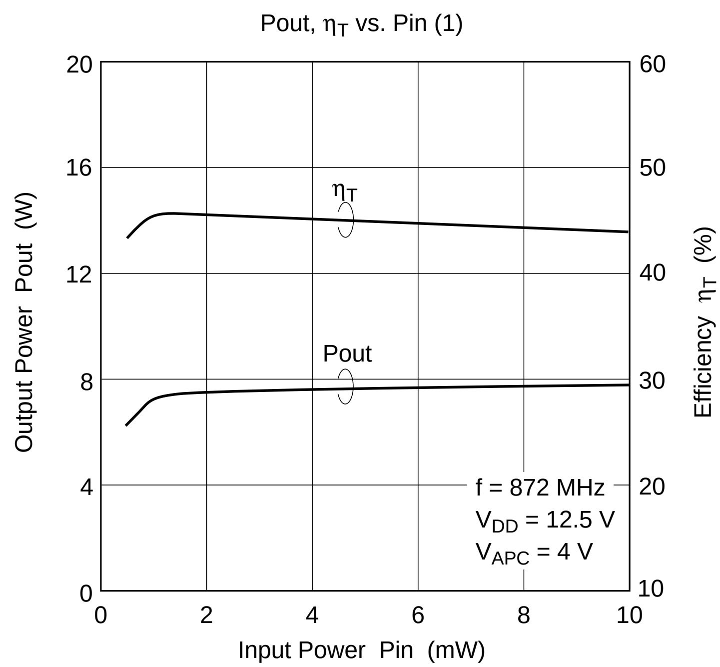


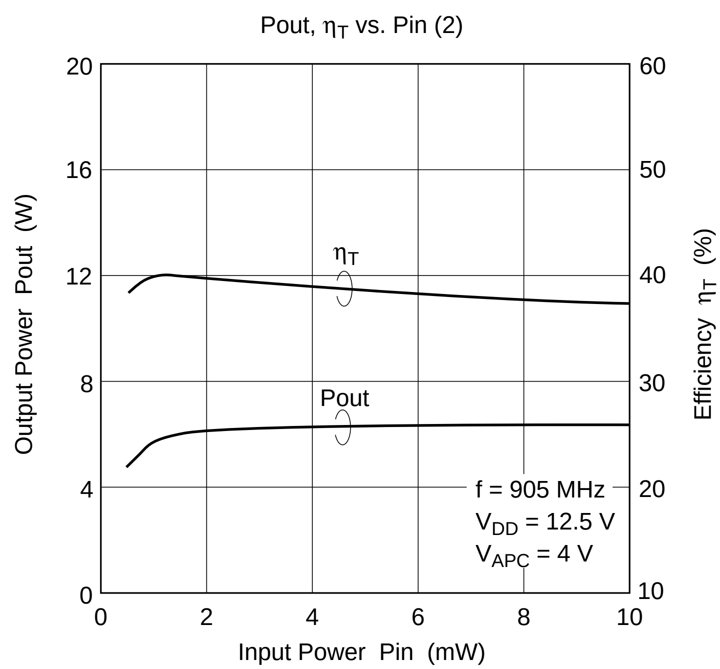
VAPC, ηT, VSWR (in) vs. Frequency
Pin = 2 mW
VDD = 12.5 V
Pout = 6 W
ηT
VAPC
VSWRin
V.S.W.R. (in)
Apc Voltage VAPC (V)
Efficiency ηT (%)
Frequency f (MHz)
872
883
894
905



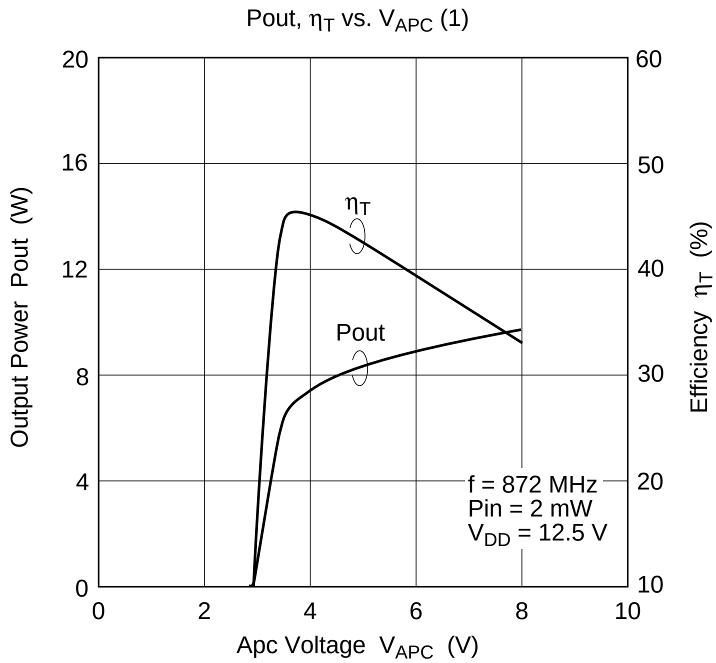
Pout, ηT, VSWR (in) vs. Frequency
Pin = 2 mW
VDD = 12.5 V
VAPC = 4 V
ηT
Pout
VSWRin
V.S.W.R. (in)
Output Power Pout (W)
Efficiency ηT (%)
Frequency f (MHz)
872
883
894
905

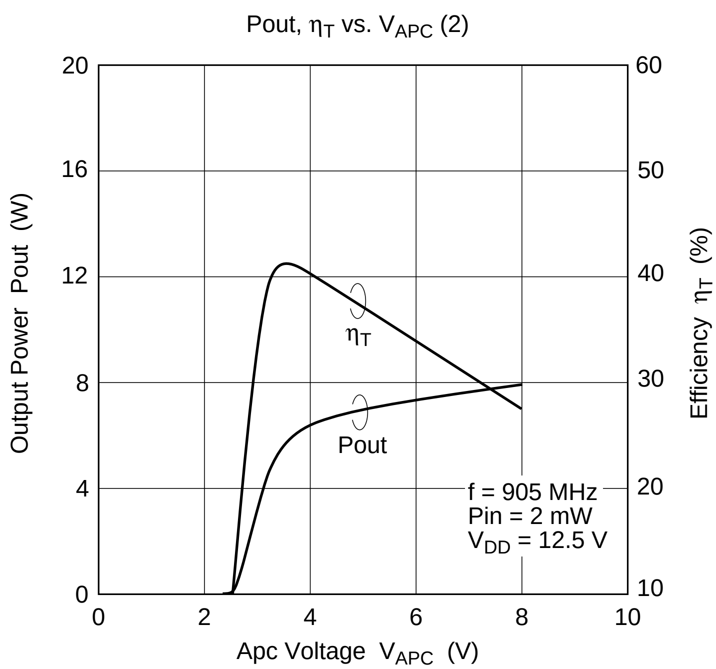
PF0032 (cont)


Pout, η_T vs. Pin (1)
Output Power Pout (W)
Efficiency η_T (%)
η_T
Pout
f = 872 MHz
V_{DD} = 12.5 V
V_{APC} = 4 V
Input Power Pin (mW)

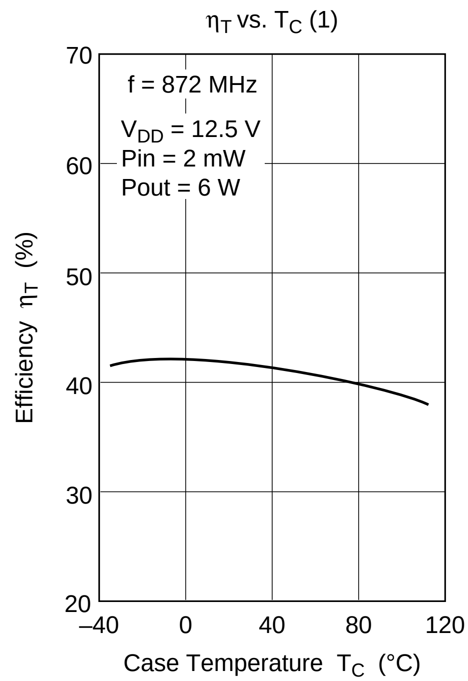

Pout, η_T vs. Pin (2)
Output Power Pout (W)
Efficiency η_T (%)
η_T
Pout
f = 905 MHz
V_{DD} = 12.5 V
V_{APC} = 4 V
Input Power Pin (mW)

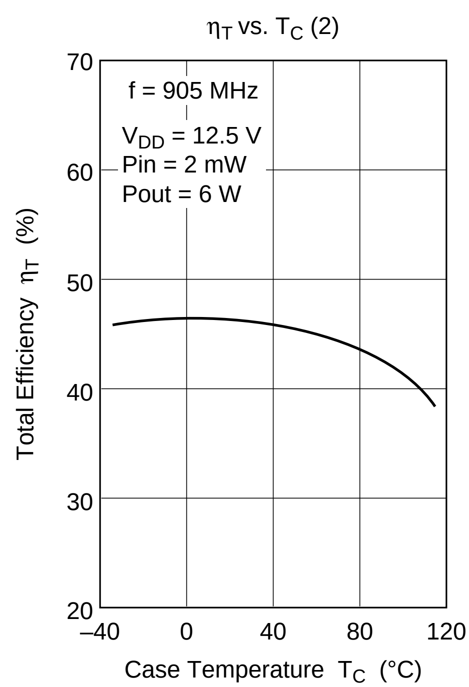
PF0032 (cont)


Pout, η_T vs. V_{APC} (1)
Output Power Pout (W)
Efficiency η_T (%)
η_T
Pout
f = 872 MHz
Pin = 2 mW
V_{DD} = 12.5 V
Apc Voltage V_{APC} (V)

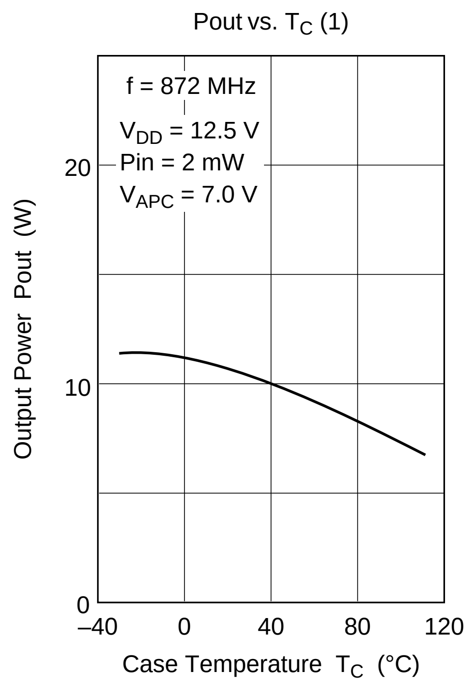

Pout, η_T vs. V_{APC} (2)
Output Power Pout (W)
Efficiency η_T (%)
η_T
Pout
f = 905 MHz
Pin = 2 mW
V_{DD} = 12.5 V
Apc Voltage V_{APC} (V)

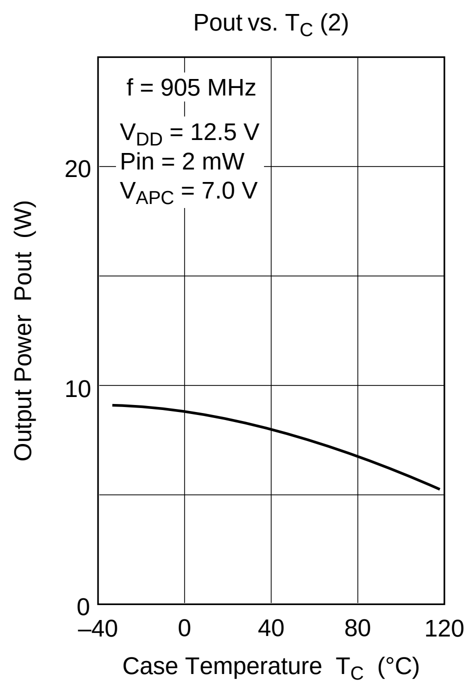
PF0032 (cont)


ηT vs. TC (1)
f = 872 MHz
VDD = 12.5 V
Pin = 2 mW
Pout = 6 W
Efficiency ηT (%)
70
60
50
40
30
20
–40
0
40
80
120
Case Temperature TC (°C)

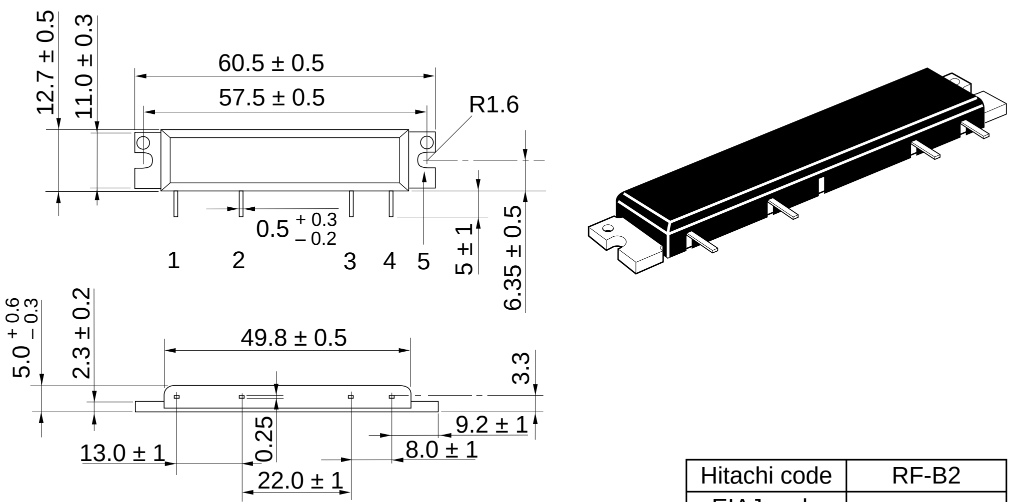

ηT vs. TC (2)
f = 905 MHz
VDD = 12.5 V
Pin = 2 mW
Pout = 6 W
Total Efficiency ηT (%)
70
60
50
40
30
20
–40
0
40
80
120
Case Temperature TC (°C)

PF0032 (cont)


Pout vs. T_C (1)
f = 872 MHz
V_{DD} = 12.5 V
Pin = 2 mW
V_{APC} = 7.0 V
Output Power Pout (W)
0
10
20
–40
0
40
80
120
Case Temperature T_C (°C)


Pout vs. T_C (2)
f = 905 MHz
V_{DD} = 12.5 V
Pin = 2 mW
V_{APC} = 7.0 V
Output Power Pout (W)
0
10
20
–40
0
40
80
120
Case Temperature T_C (°C)

Package Dimensions/ Unit: mm



Hitachi code	RF-B2
EIAJ code	—
JEDEC code	—

HITACHI

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