
PF0121

MOS FET Power Amplifier Module for GSM Mobile Phone

HITACHI

ADE-208-097A (Z)
2nd. Edition
July 1996

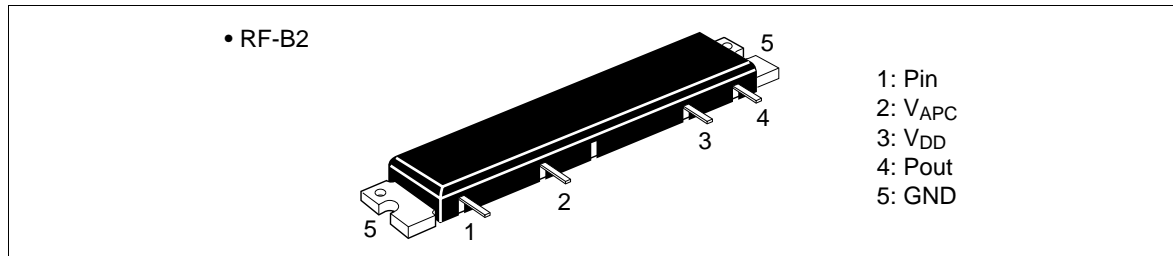
Application

For GSM CLASS2 890 to 915 MHz

Features

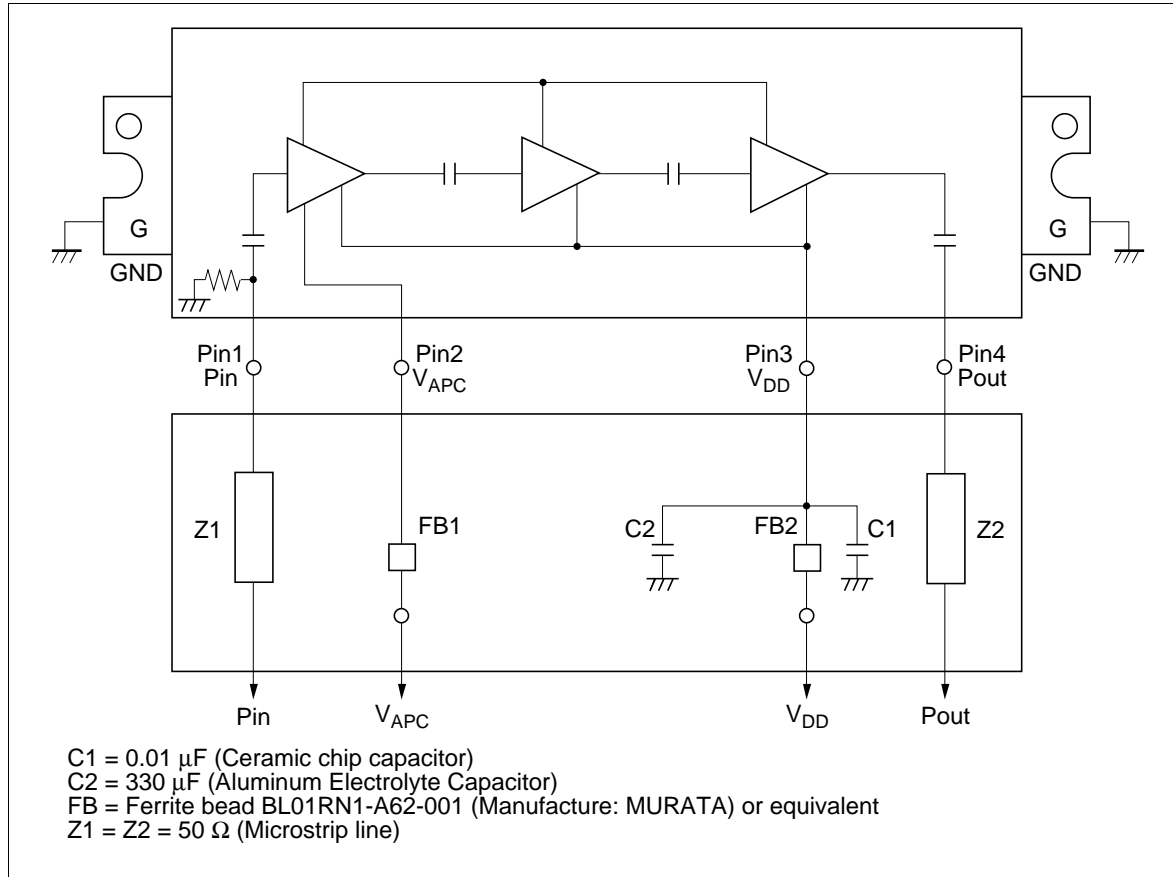
- Low power control current: 0.9 mA Typ
- High speed switching: 1.5 μ sec Typ
- Wide power control range: 100 dB Typ

Pin Arrangement



PF0121

Internal Diagram and External Circuit



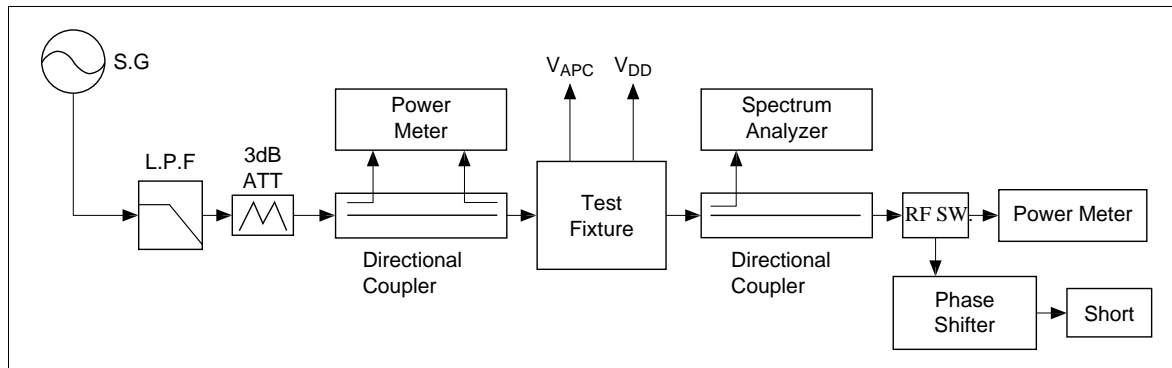
Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$)

Item	Symbol	Rating	Unit
Supply voltage	VDD	17	V
Supply current	IDD	6	A
APC voltage	VAPC	8	V
Input power	Pin	20	mW
Operating case temperature	T_c (op)	-30 to +110	$^\circ\text{C}$
Storage temperature	T_{stg}	-40 to +110	$^\circ\text{C}$

Electrical Characteristics ($T_c = 25^\circ\text{C}$)

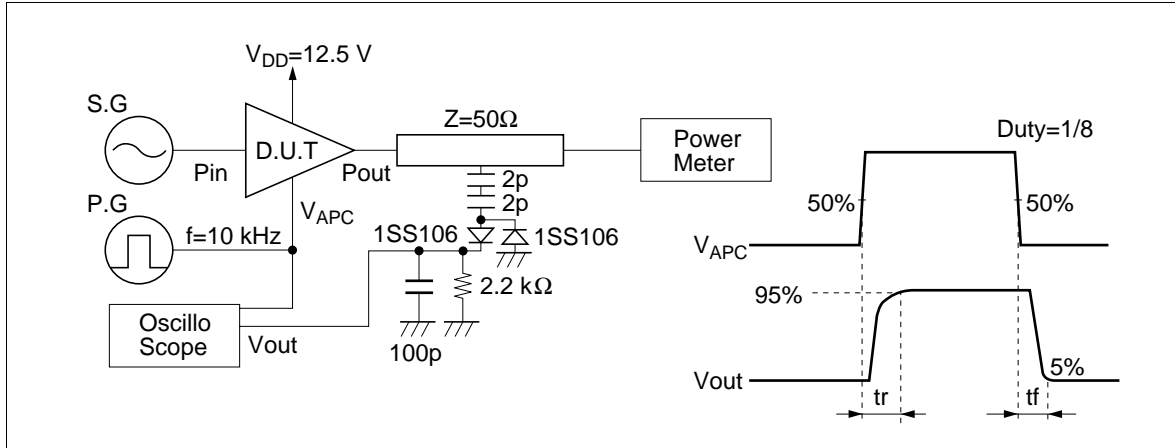
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Drain cutoff current	I_{DS}	—	—	500	μA	$V_{DD} = 17\text{ V}, V_{APC} = 0\text{ V}$
Total efficiency	η_T	30	35	—	%	$P_{in} = 2\text{ mW}, V_{DD} = 12.5\text{ V},$
2nd harmonic distortion	2nd H.D.	—	-50	-40	dBc	$P_{out} = 13\text{ W}$ (at APC controlled),
3rd harmonic distortion	3rd H.D.	—	-55	-45	dBc	$R_L = R_g = 50\ \Omega, T_c = 25^\circ\text{C}$
Input VSWR	VSWR (in)	—	2	3	—	
Output power (1)	$P_{out} (1)$	17	23	—	W	$P_{in} = 2\text{ mW}, V_{DD} = 12.5\text{ V}, V_{APC} = 7\text{ V},$ $R_L = R_g = 50\ \Omega, T_c = 25^\circ\text{C}$
Output power (2)	$P_{out} (2)$	9	12	—	W	$P_{in} = 2\text{ mW}, V_{DD} = 10.3\text{ V}, V_{APC} = 7\text{ V},$ $R_L = R_g = 50\ \Omega, T_c = 80^\circ\text{C}$
Isolation	—	—	-60	-40	dBm	$P_{in} = 2\text{ mW}, V_{DD} = 12.5\text{ V}, V_{APC} = 0.5\text{ V},$ $R_L = R_g = 50\ \Omega, T_c = 25^\circ\text{C}$
Switching time	t_r, t_f	—	1.5	2	μs	$P_{in} = 2\text{ mW}, V_{DD} = 12.5\text{ V}, P_{out} = 13\text{ W},$ $R_L = R_g = 50\ \Omega, T_c = 25^\circ\text{C}$
Stability	—	No parasitic oscillation			—	$P_{in} = 2\text{ mW}, V_{DD} = 12.5\text{ V},$ $P_{out} \leq 13\text{ W}$ (at APC controlled), $R_g = 50\ \Omega, T_c = 25^\circ\text{C},$ Output VSWR = 20:1 All phases

Test System Diagram



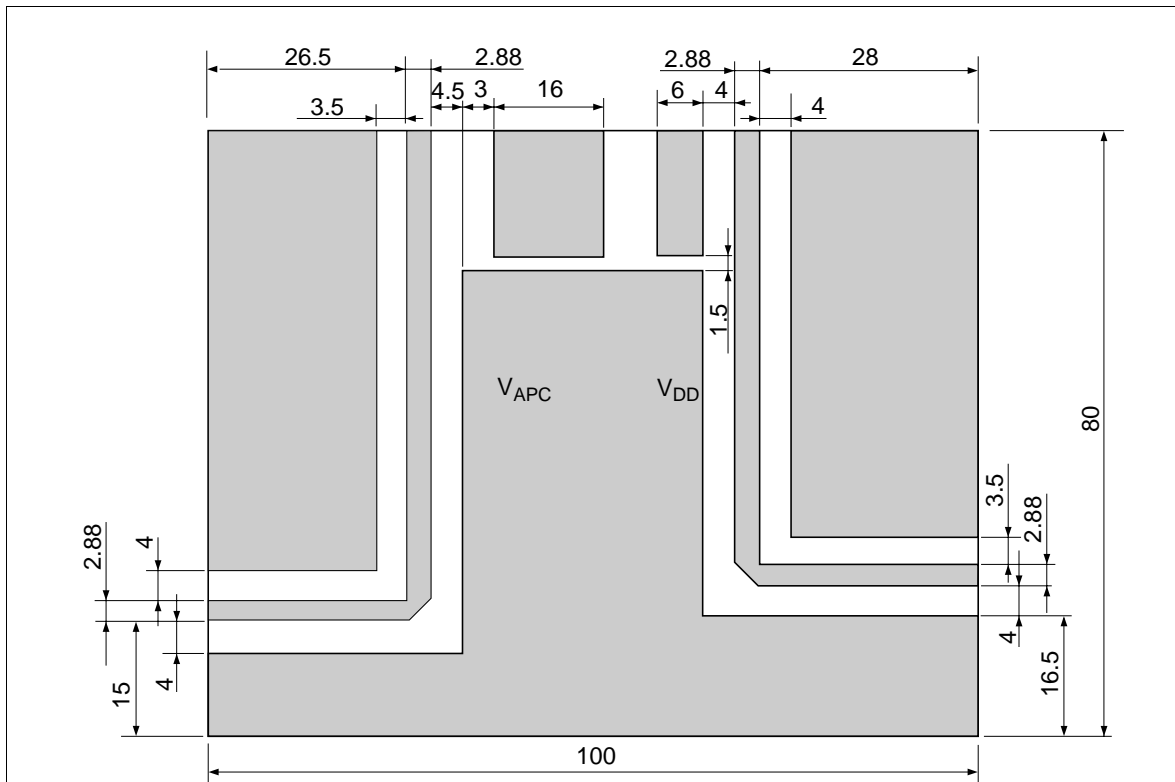
PF0121

Switching Time Test Diagram



Test Fixture Pattern

Unit: mm



Grass Epoxy Double sided PCB

($t = 1.6\text{ mm}$, $\epsilon_r = 4.8$)

C1=0.01 μF (Ceramic Chip Capacitor)

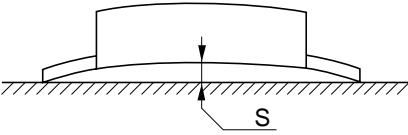
C2=330 μF (Aluminum Electrolyte Capacitor)

L1=L2 : BLO2RN1-R62 (Manufacturer : MURATA) or equivalent (Ferrite Bead Inductor)

The coefficient of RF line loss in the P.C.B is showed bellow.

$$1/(S_{21})^2 = 1/(0.9805)^2 = 1.068$$

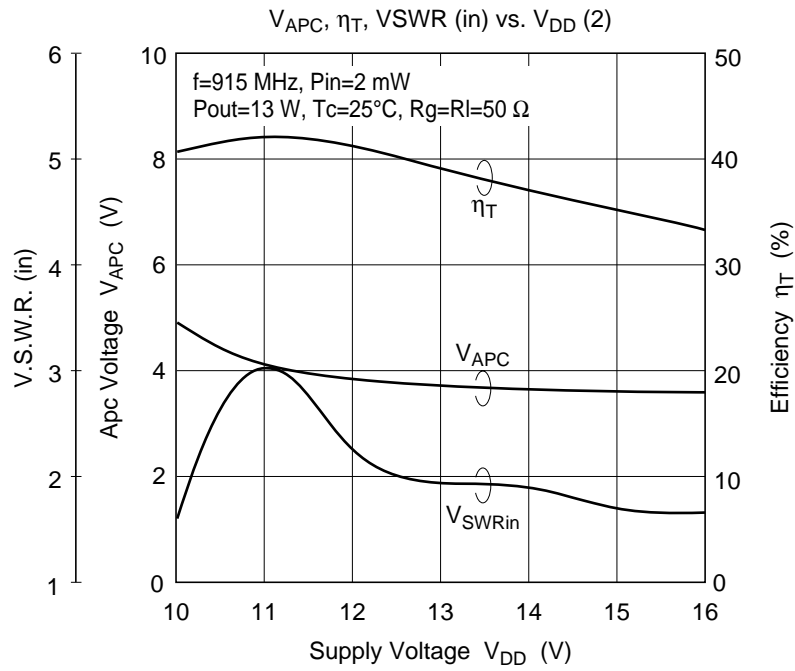
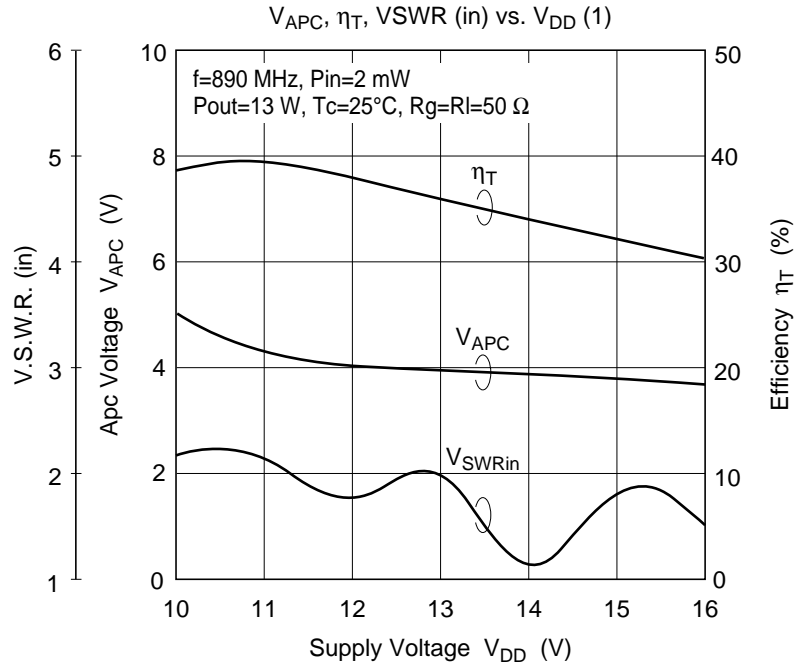
Mechanical Characteristics

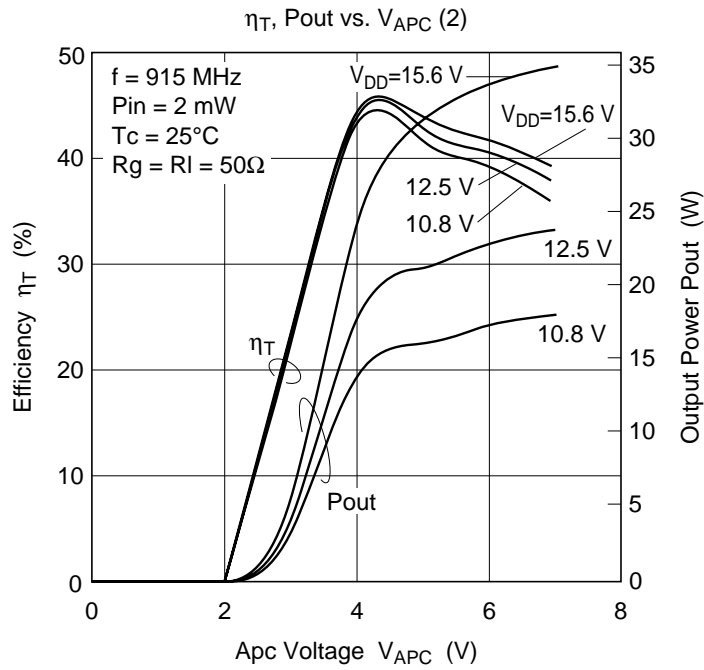
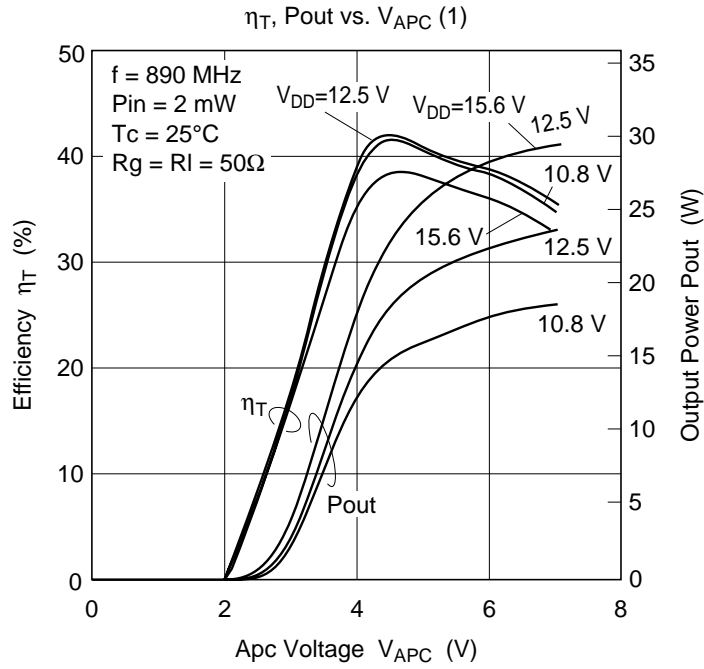
Item	Conditions	Spec
Torque for screw up the heatsink flange	M3 Screw Bolts	4 to 6 kg•cm
Warp size of the heatsink flange: S		S = 0 +0.3/-0 mm

Note for Use

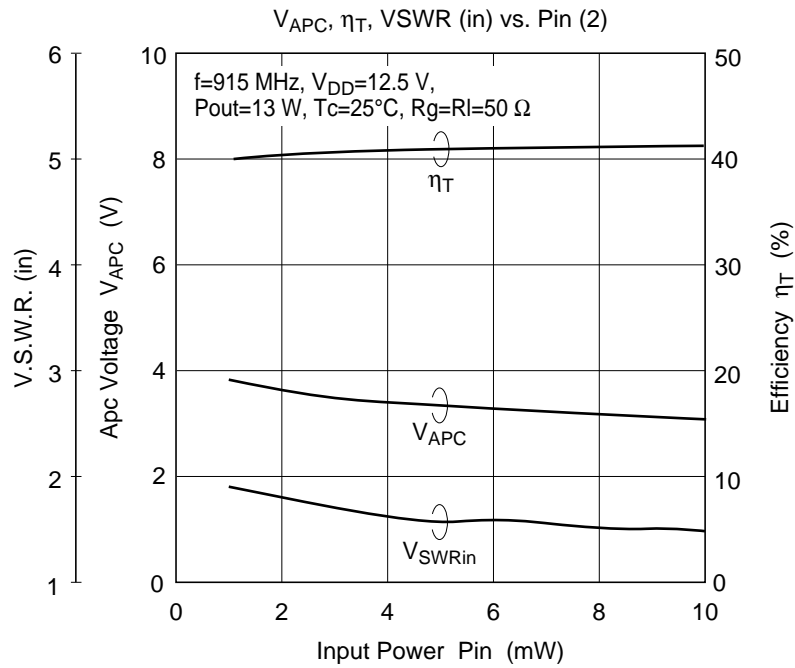
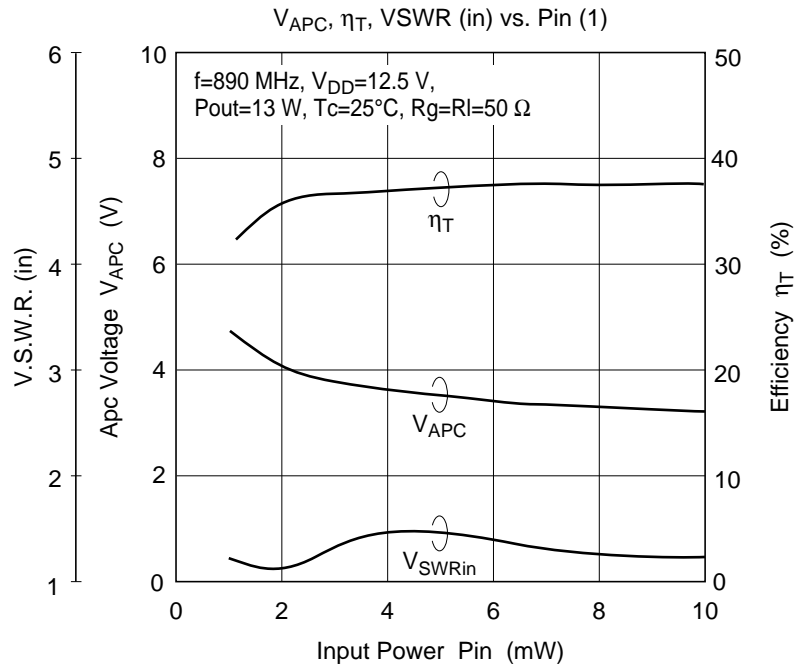
- Unevenness and distortion at the surface of the heatsink attached module should be less than 0.05 mm.
- It should not be existed any dust between module and heatsink.
- MODULE should be separated from PCB less than 1.5 mm.
- Soldering temperature and soldering time should be less than 230°C, 10 sec.
(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.

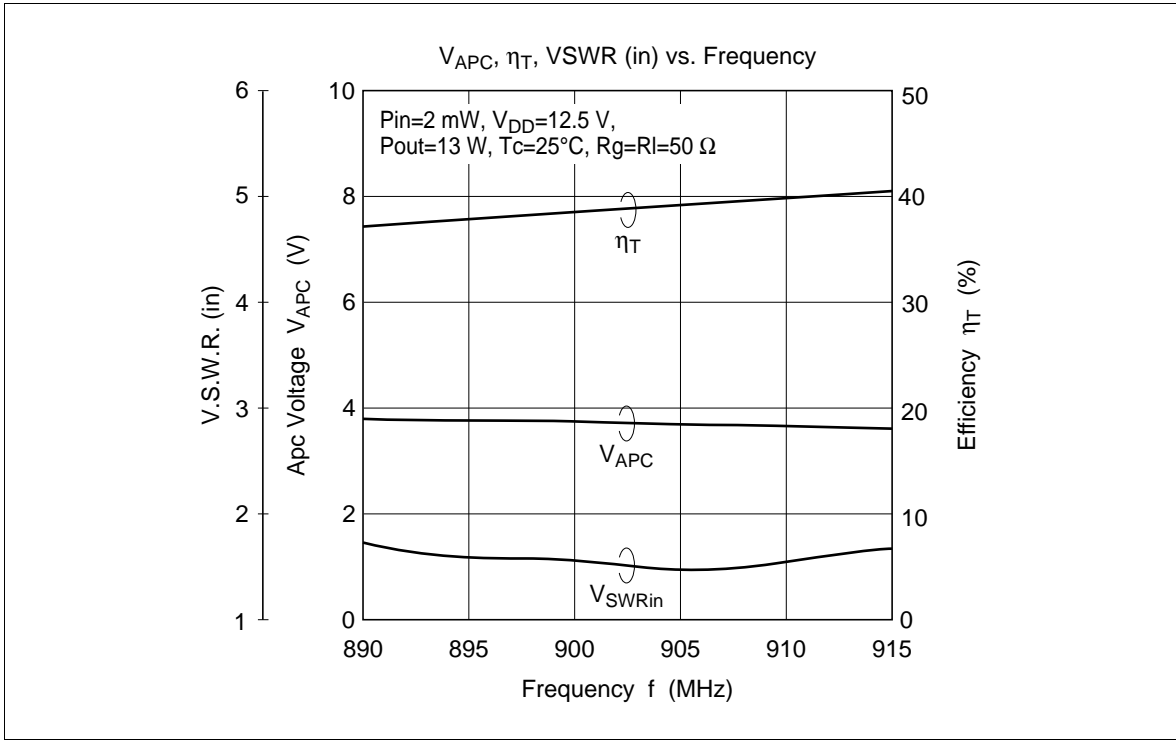
Characteristics Curve





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PF0121

Package Dimensions

Unit: mm

