
PF0121

MOS FET Power Amplifier Module for GSM Mobile Phone

HITACHI

ADE-208-097A (Z)

2nd. Edition

July 1996

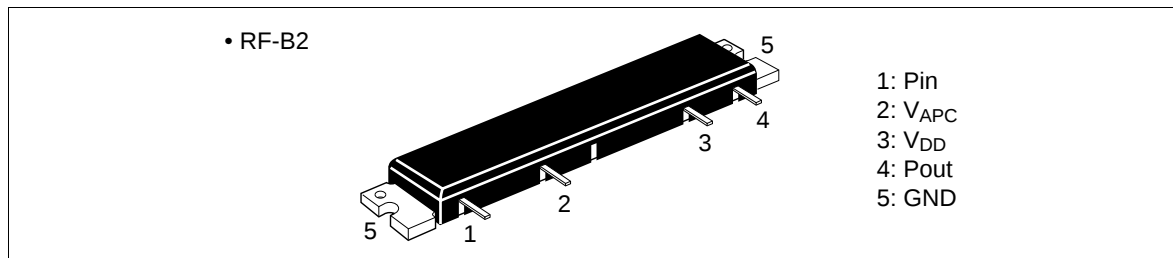
Application

For GSM CLASS2 890 to 915 MHz

Features

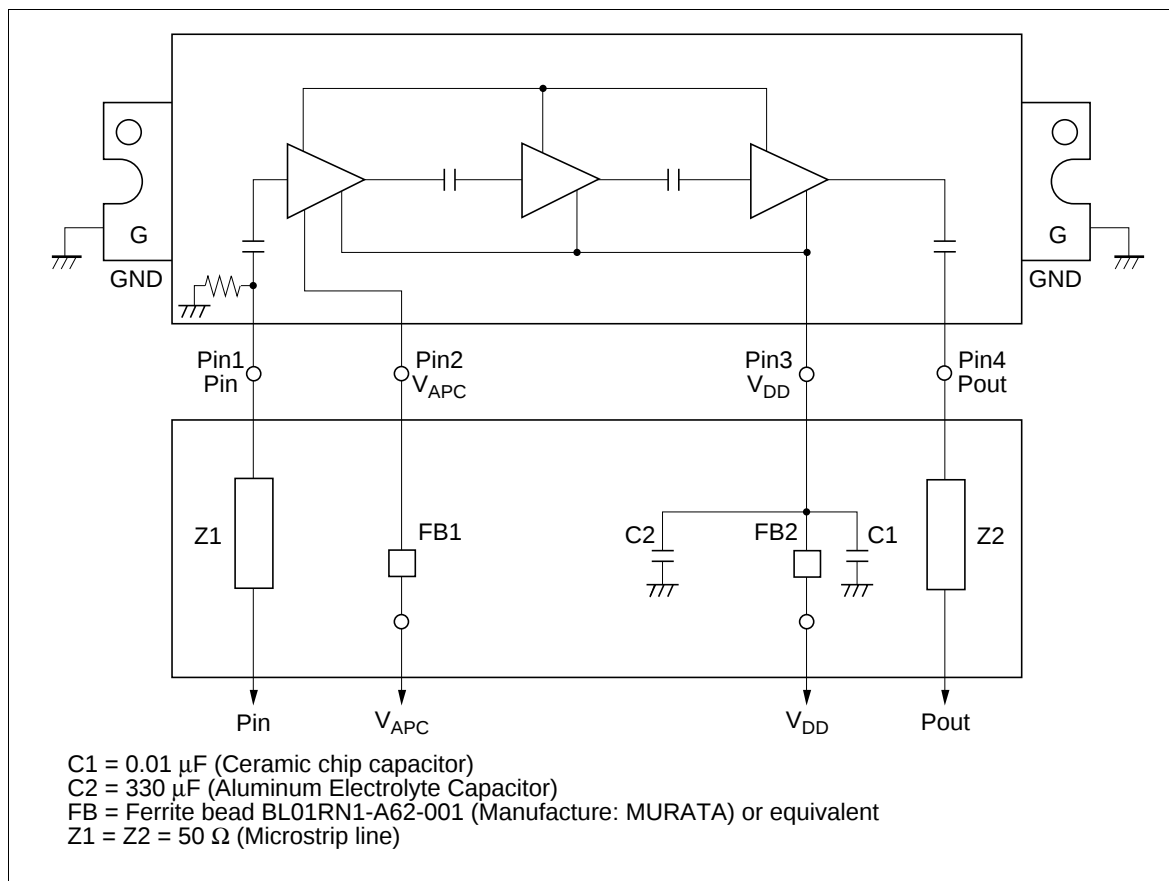
- Low power control current: 0.9 mA Typ
- High speed switching: 1.5 μ sec Typ
- Wide power control range: 100 dB Typ

Pin Arrangement



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Internal Diagram and External Circuit



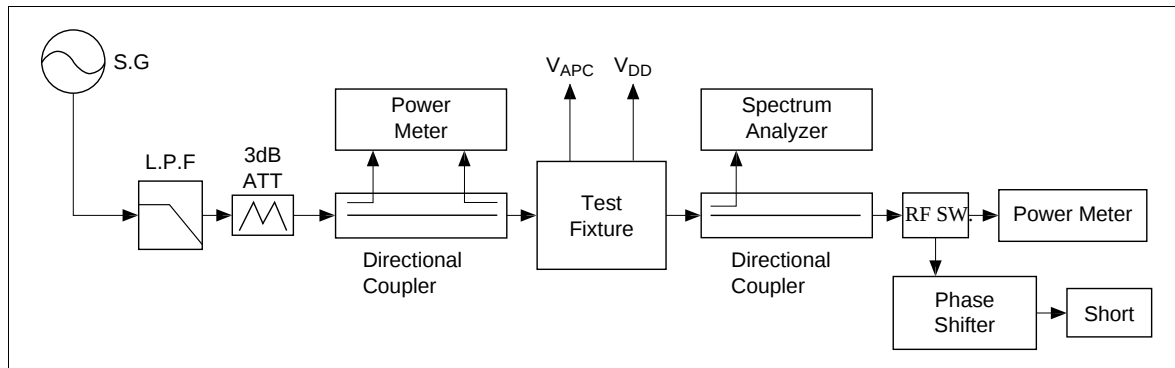
Absolute Maximum Ratings (T_c = 25°C)

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	°C
Storage temperature	T _{stg}	−40 to +110	°C

Electrical Characteristics (T_c = 25°C)

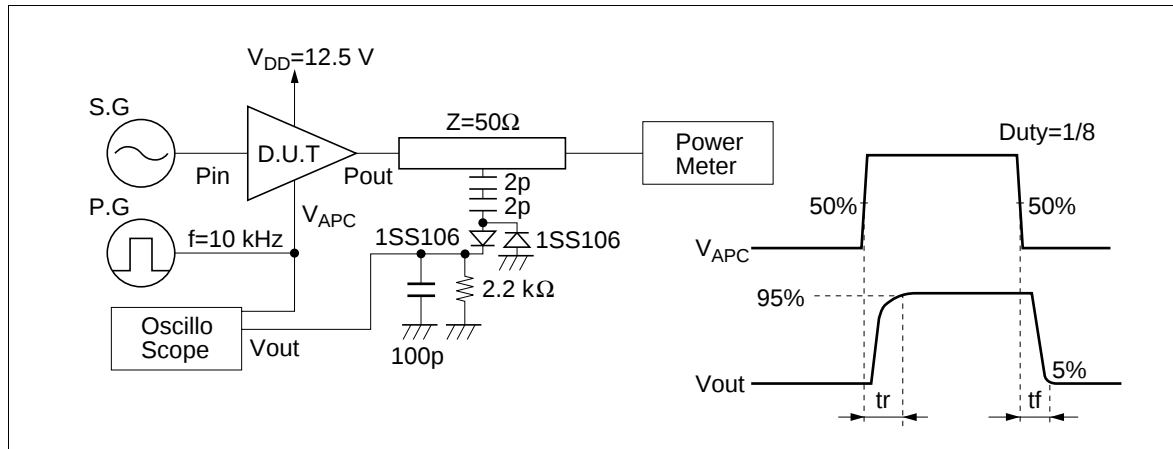
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Drain cutoff current	I _{DS}	—	—	500	μA	V _{DD} = 17 V, V _{APC} = 0 V
Total efficiency	η _T	30	35	—	%	Pin = 2 mW, V _{DD} = 12.5 V,
2nd harmonic distortion	2nd H.D.	—	−50	−40	dBc	P _{out} = 13 W (at APC controlled),
3rd harmonic distortion	3rd H.D.	—	−55	−45	dBc	R _L = R _g = 50 Ω, T _c = 25°C
Input VSWR	VSWR (in)	—	2	3	—	
Output power (1)	P _{out} (1)	17	23	—	W	Pin = 2 mW, V _{DD} = 12.5 V, V _{APC} = 7 V, R _L = R _g = 50 Ω, T _c = 25°C
Output power (2)	P _{out} (2)	9	12	—	W	Pin = 2 mW, V _{DD} = 10.3V, V _{APC} = 7 V, R _L = R _g = 50 Ω, T _c = 80°C
Isolation	—	—	−60	−40	dBm	Pin = 2 mW, V _{DD} = 12.5 V, V _{APC} = 0.5 V, R _L = R _g = 50 Ω, T _c = 25°C
Switching time	t _r , t _f	—	1.5	2	μs	Pin = 2 mW, V _{DD} = 12.5 V, P _{out} = 13 W, R _L = R _g = 50 Ω, T _c = 25°C
Stability	—	No parasitic oscillation			—	Pin = 2 mW, V _{DD} = 12.5 V, P _{out} ≤ 13 W (at APC controlled), R _g = 50 Ω, T _c = 25°C, Output VSWR = 20:1 All phases

Test System Diagram



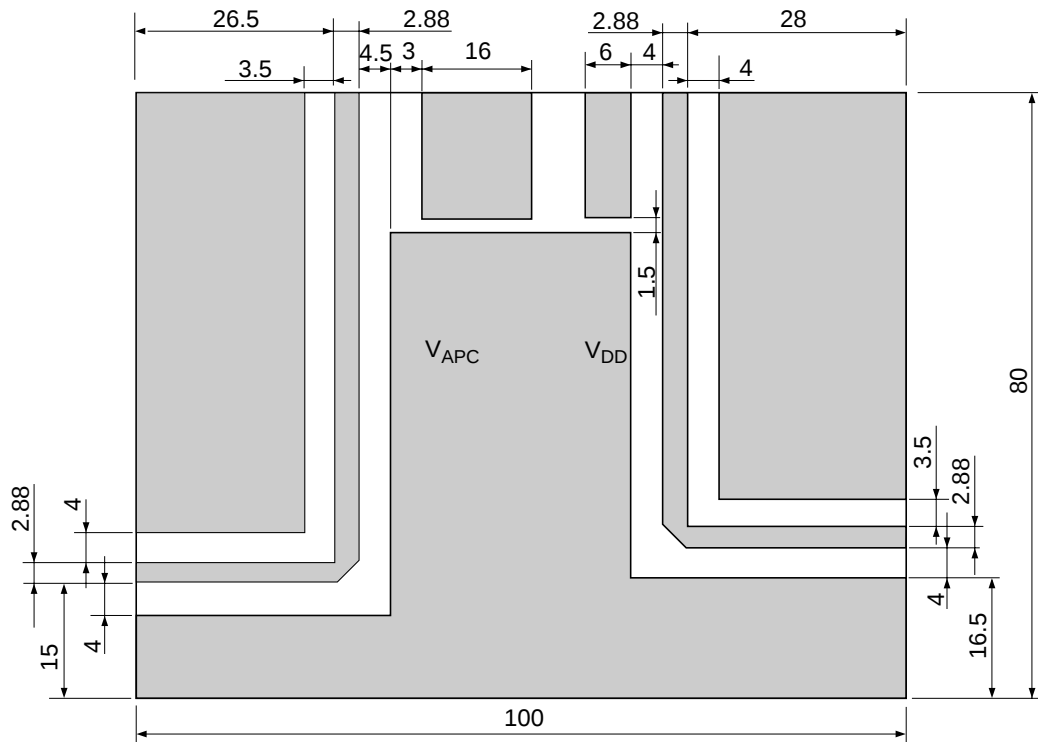
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Switching Time Test Diagram



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)

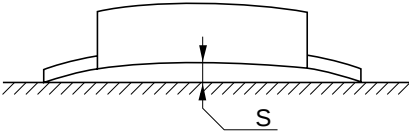
C2=330 μF (Aluminum Electrolyte Capacitor)

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.

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

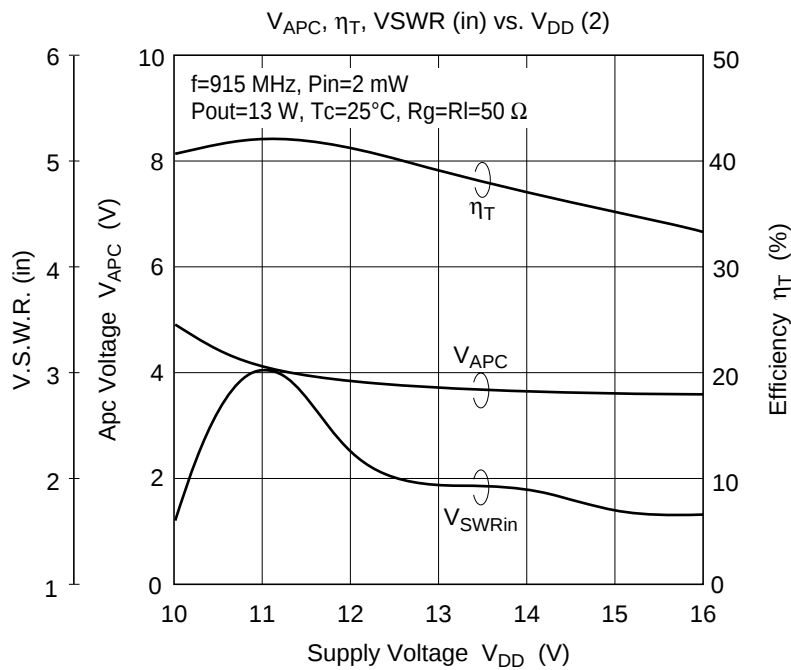
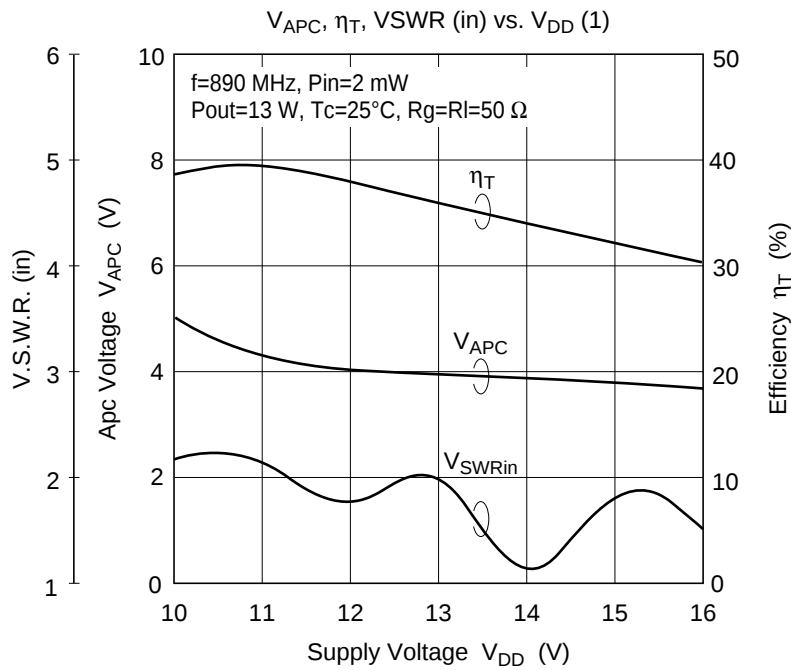
Mechanical Characteristics

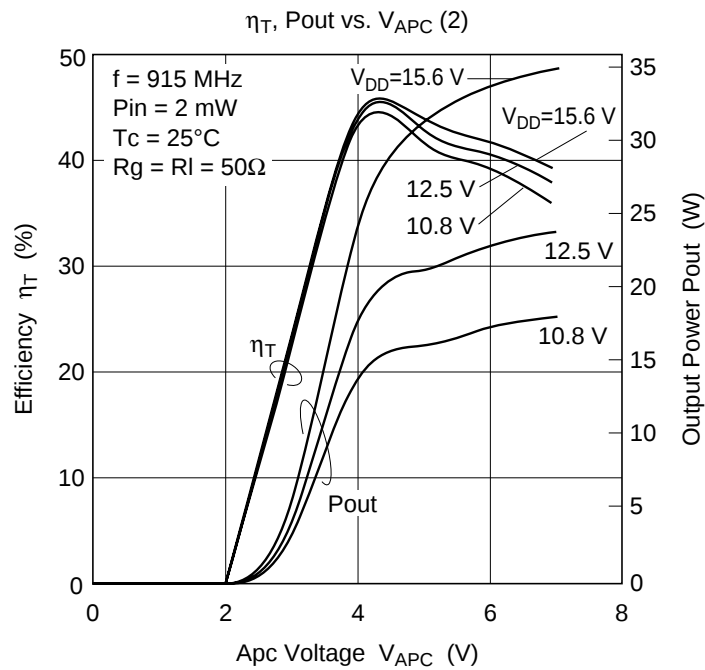
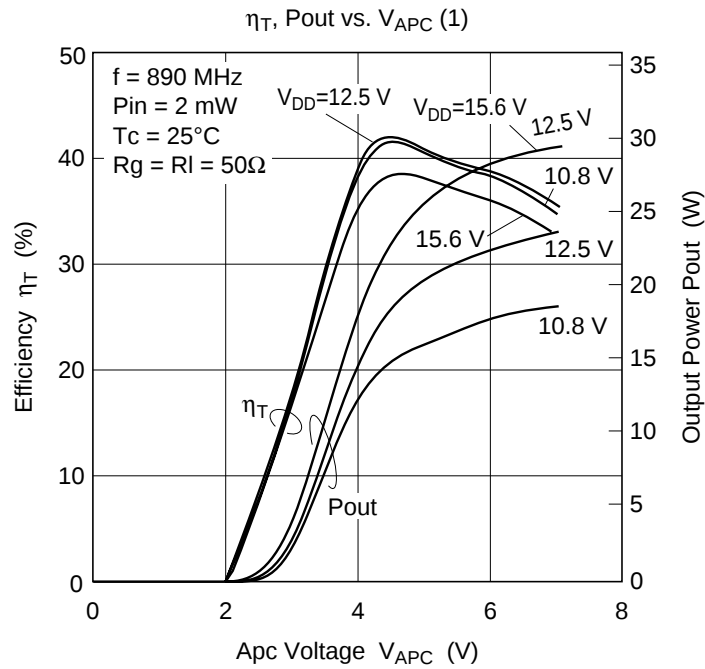
Item	Conditions	Spec
Torque for screw up the heatsink flange	M3 Screw Bolts	4 to 6 kg•cm
Warp size of the heatsink flange: S		S = 0
		+0.3/-0 mm

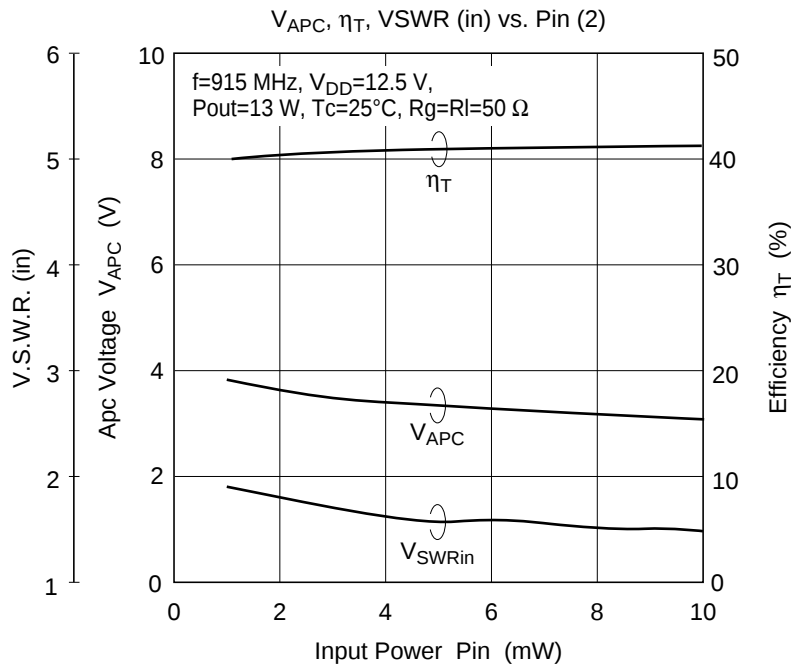
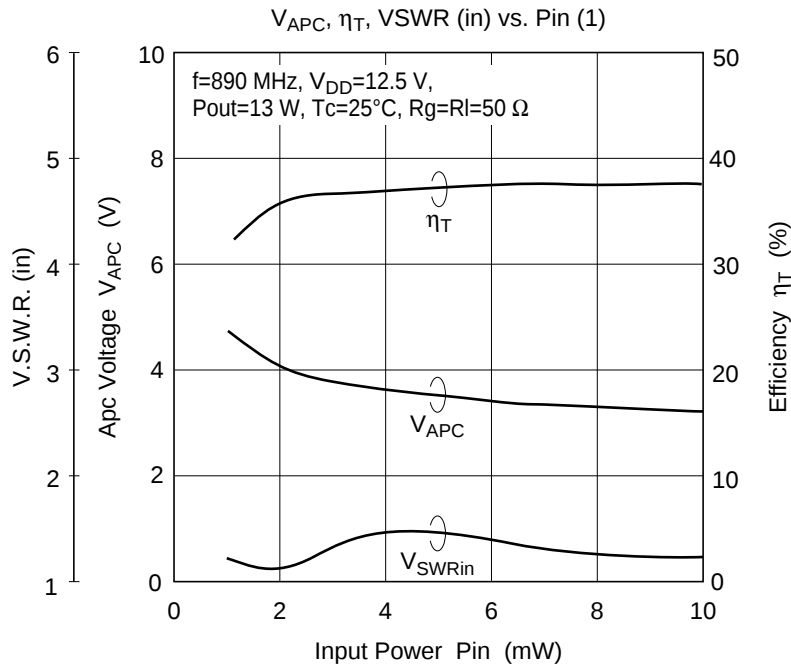
Note for Use

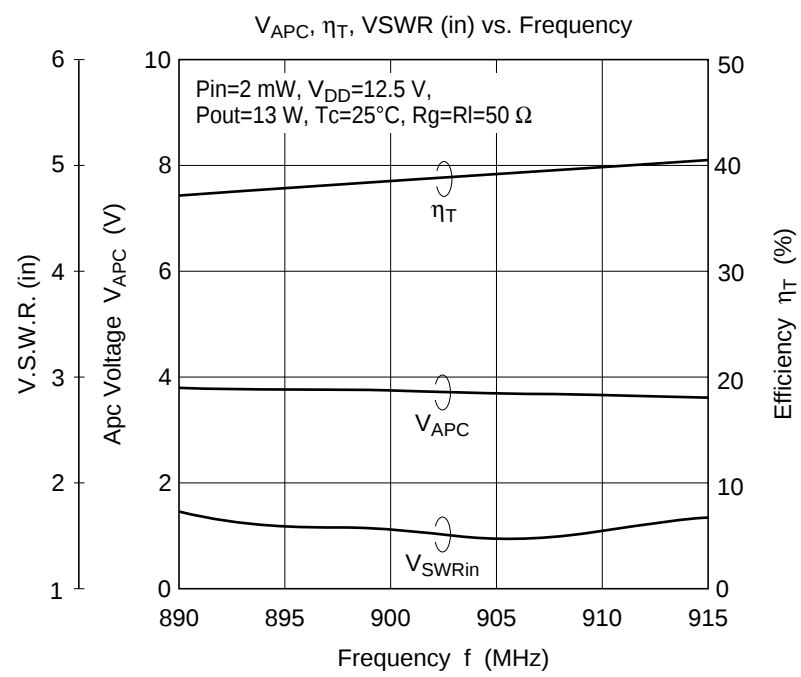
- Unevenness and distortion at the surface of the heatsink attached module should be less than 0.05 mm.
- It should not be existed any dust between module and heatsink.
- MODULE should be separated from PCB less than 1.5 mm.
- Soldering temperature and soldering time should be less than 230°C, 10 sec.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





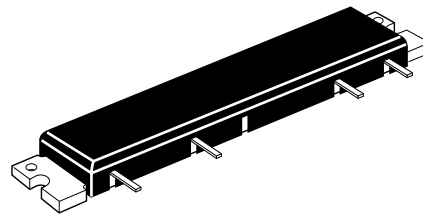
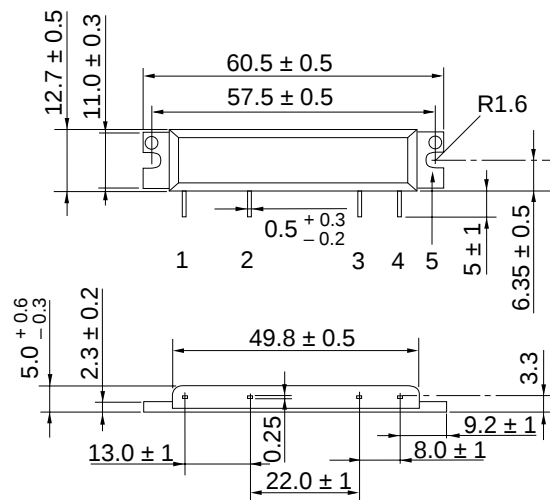




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Package Dimensions

Unit: mm



Hitachi code	RF-B2
EIAJ code	—
JEDEC code	—