
PF0121

MOS FET Power Amplifier Module for GSM Mobile Phone

HITACHI

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

Application

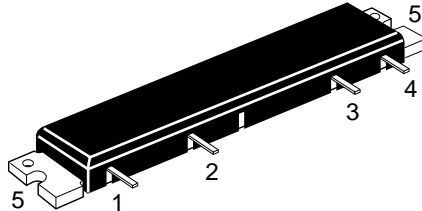
For GSM CLASS2 890 to 915 MHz

Features

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

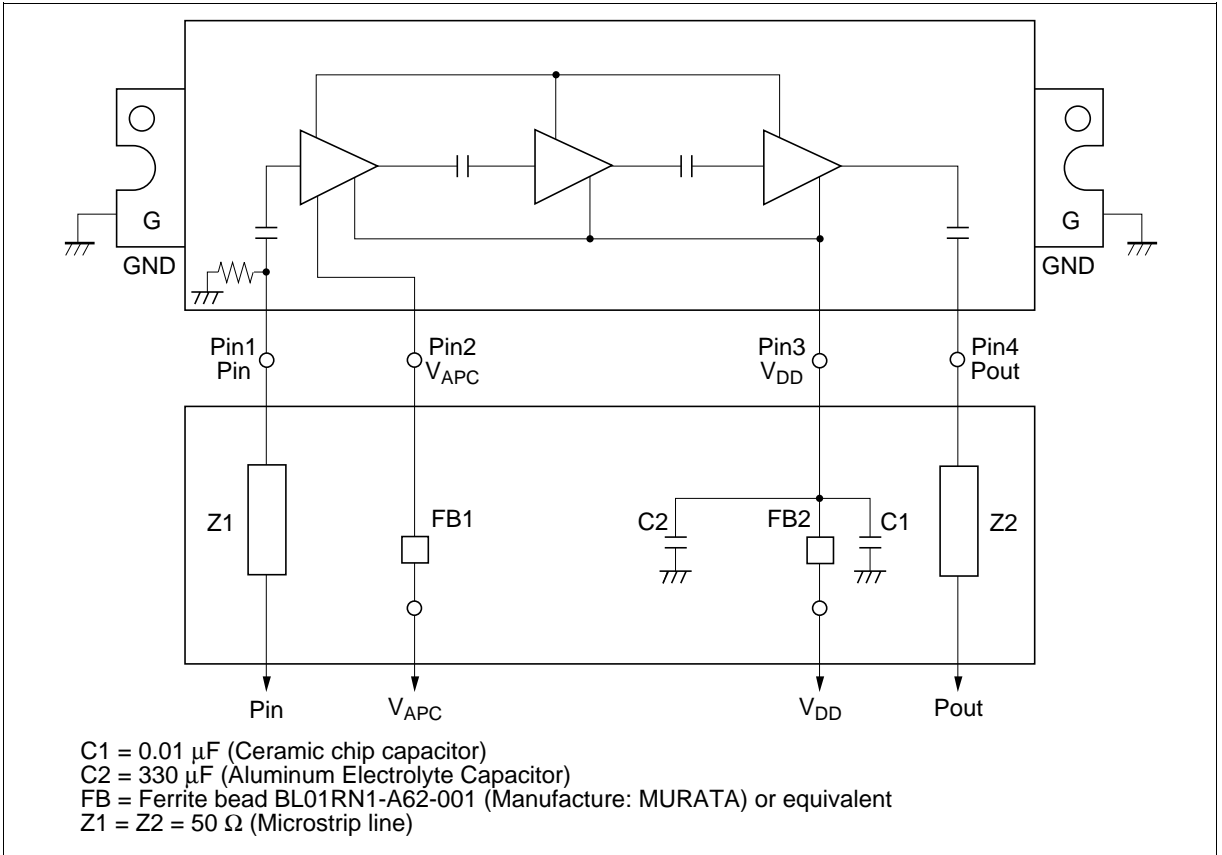
Pin Arrangement

• RF-B2



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

Internal Diagram and External Circuit



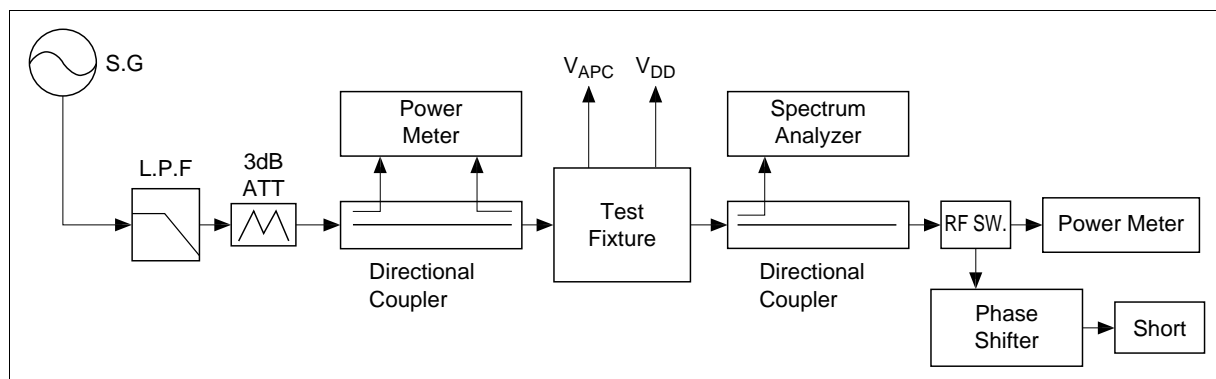
Absolute Maximum Ratings ($T_c = 25^\circ\text{C}$)

Item	Symbol	Rating	Unit
Supply voltage	V_{DD}	17	V
Supply current	I_{DD}	6	A
APC voltage	V_{APC}	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	$^\circ\text{C}$

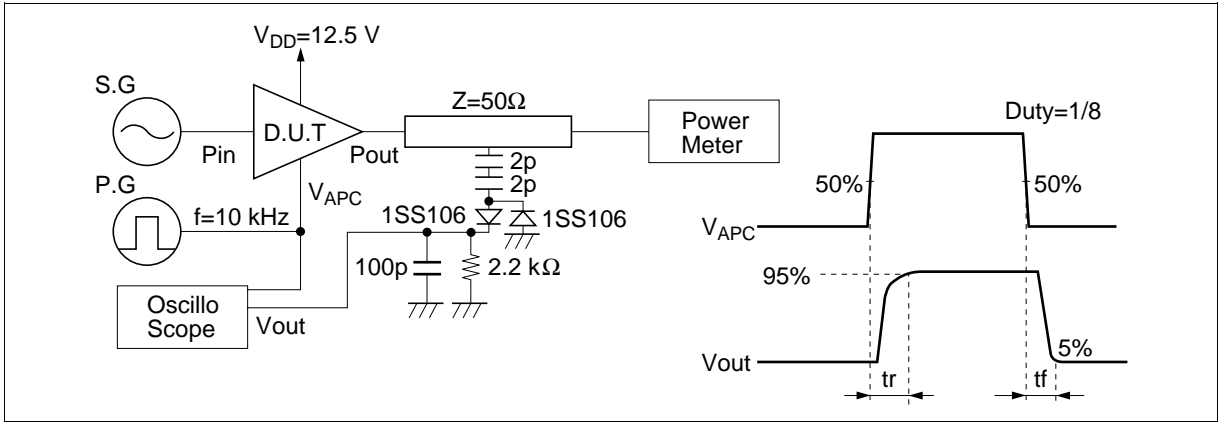
Electrical Characteristics ($T_c = 25^\circ\text{C}$)

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	—	%	$P_{in} = 2\text{ mW}, V_{DD} = 12.5\text{ V},$ $P_{out} = 13\text{ W (at APC controlled),}$
2nd harmonic distortion	2nd H.D.	—	-50	-40	dBc	$R_L = R_g = 50\ \Omega, T_c = 25^\circ\text{C}$
3rd harmonic distortion	3rd H.D.	—	-55	-45	dBc	
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

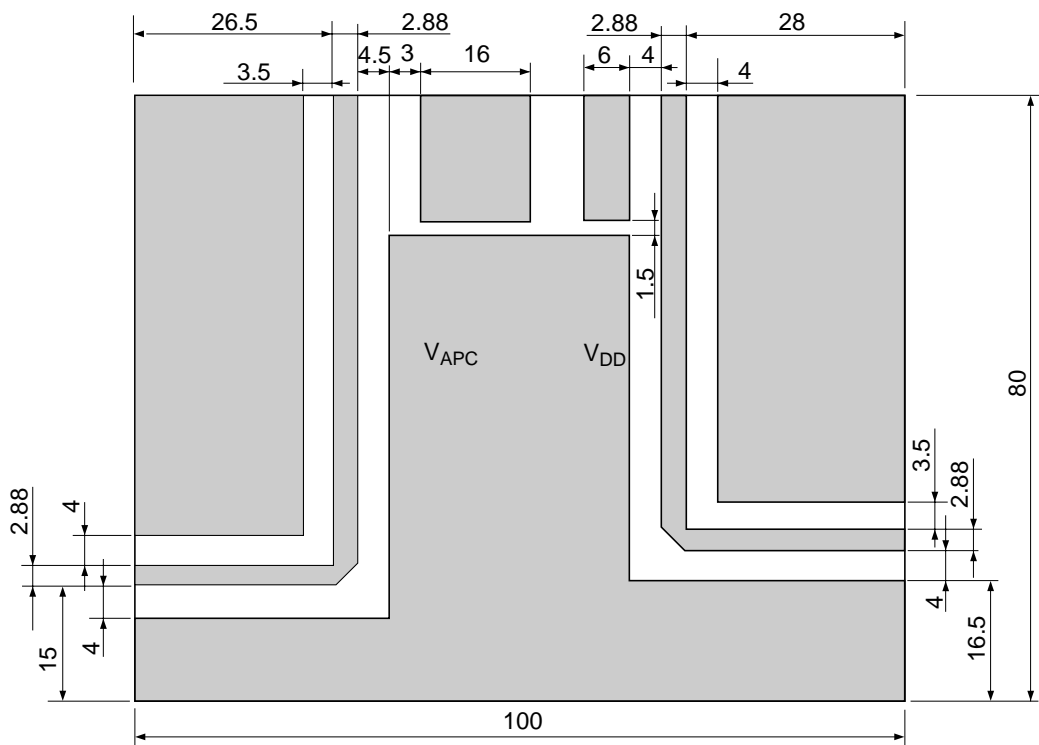


Switching Time Test Diagram



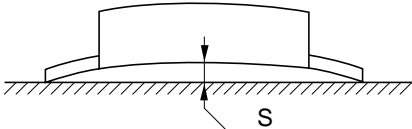
Test Fixture Pattern

Unit: mm



Grass Epoxy Double sided PCB
 (t = 1.6 mm, εr = 4.8)
 C1=0.01μF (Ceramic Chip Capacitor)
 C2=330μF (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.
 $1 / (S_{21})^2 = 1 / (0.9805)^2 = 1.068$

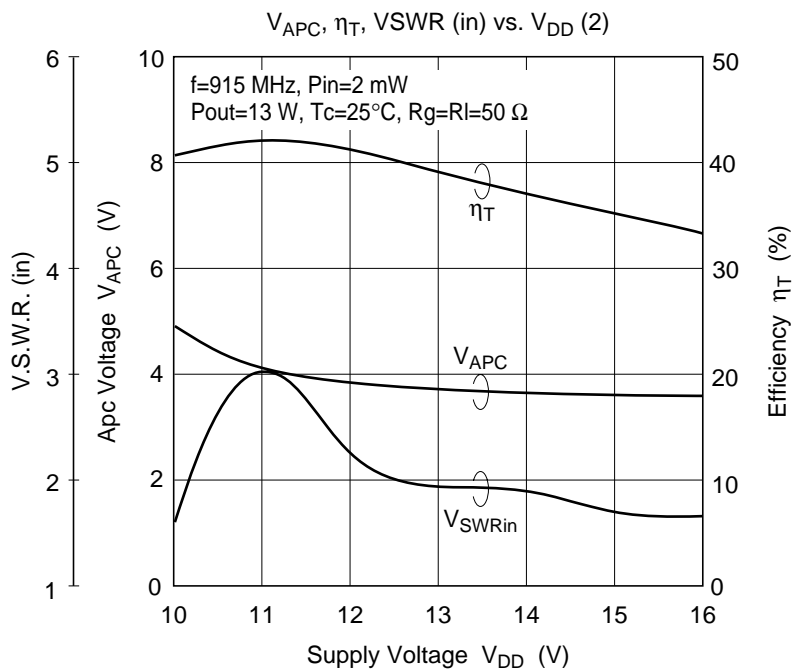
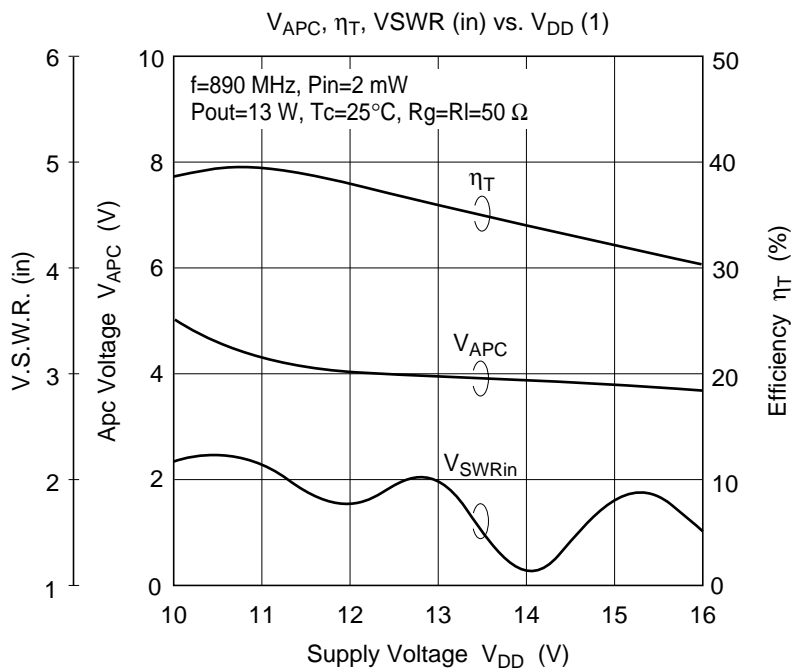
Mechanical Characteristics

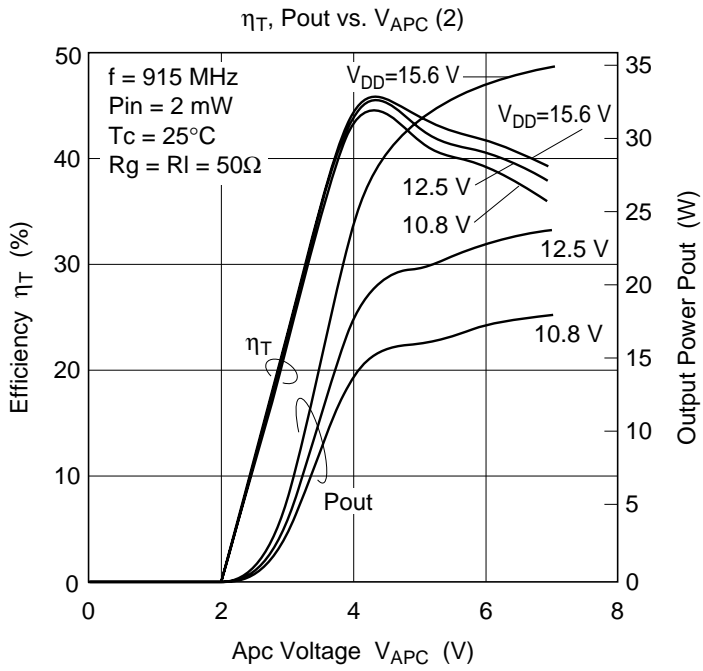
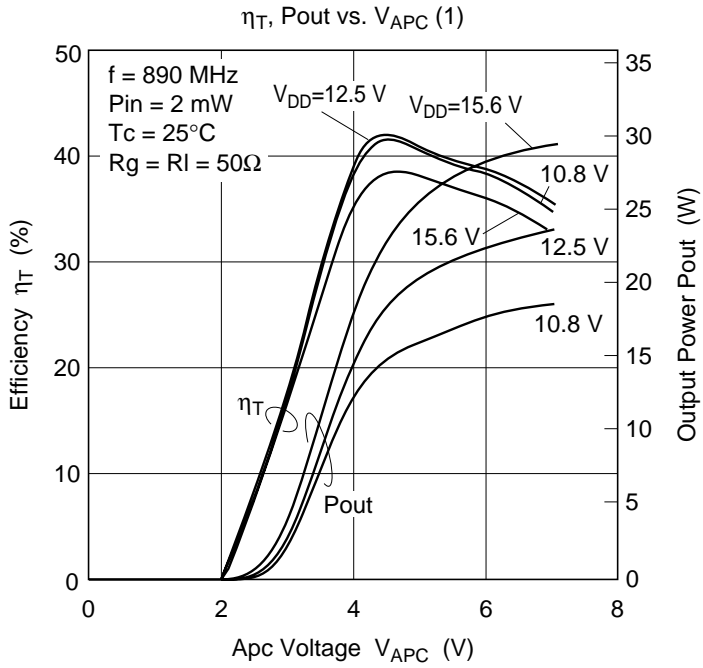
Item	Conditions	Spec
Torque for screw up the heatsink flange	M3 Screw Bolts	4 to 6 kg•cm
Warp size of the heatsink flange: S		S = 0 +0.3/-0 mm

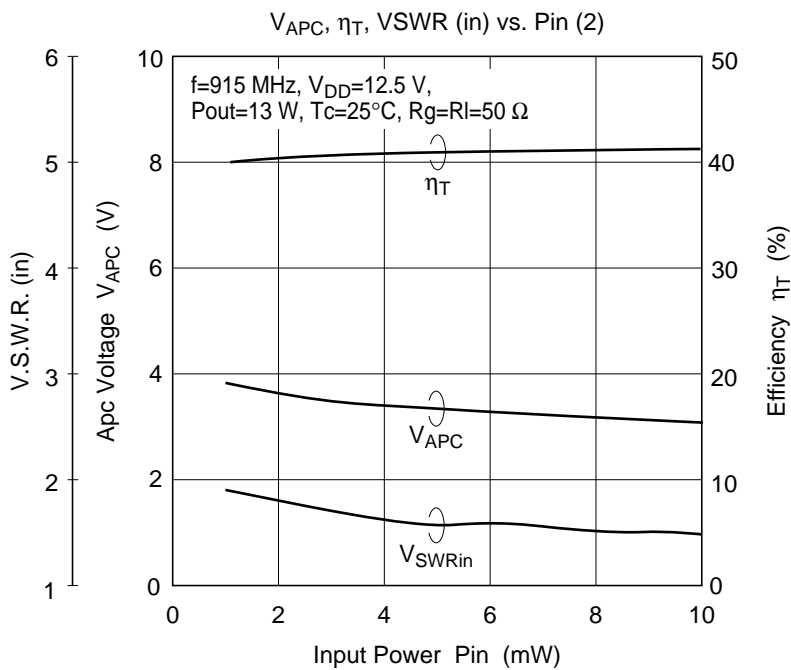
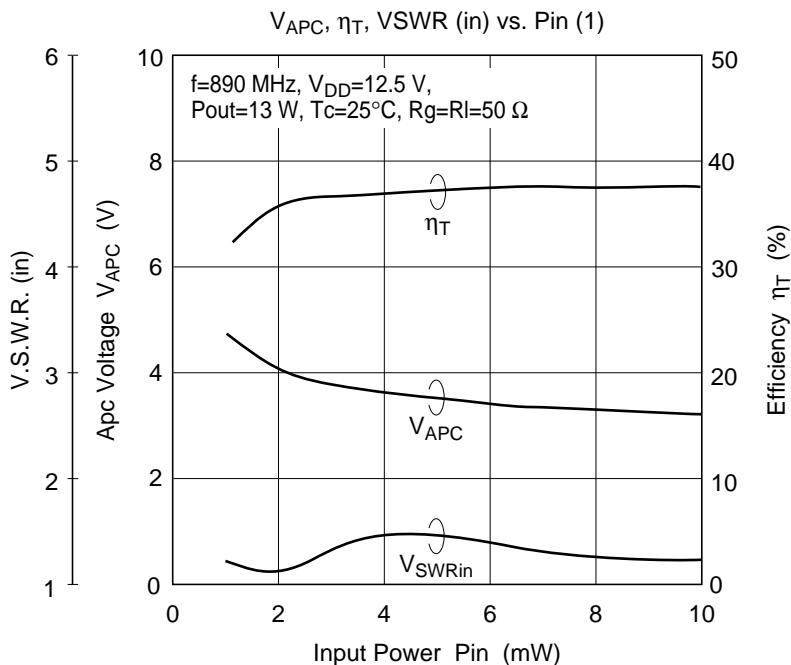
Note for Use

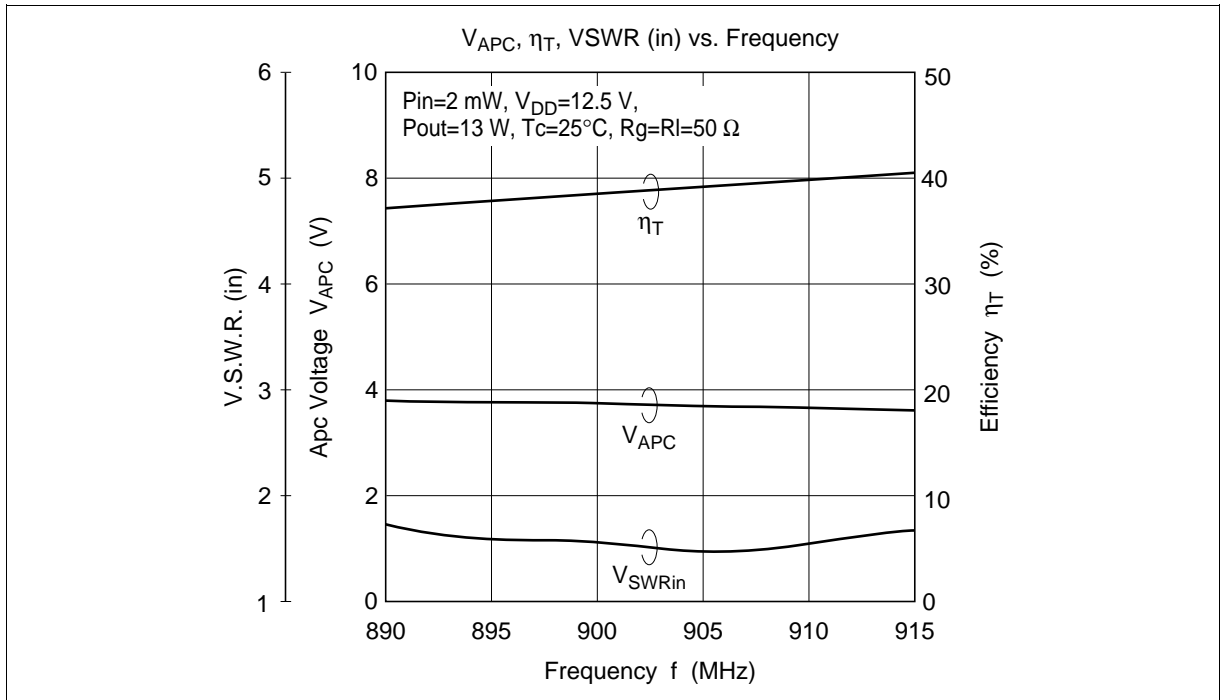
- Unevenness and distortion at the surface of the heatsink attached module should be less than 0.05 mm.
- It should not be existed any dust between module and heatsink.
- MODULE should be separated from PCB less than 1.5 mm.
Soldering temperature and soldering time should be less than 230°C, 10 sec.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

Characteristic Curves



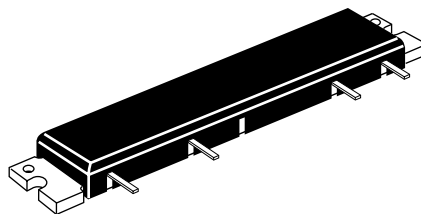
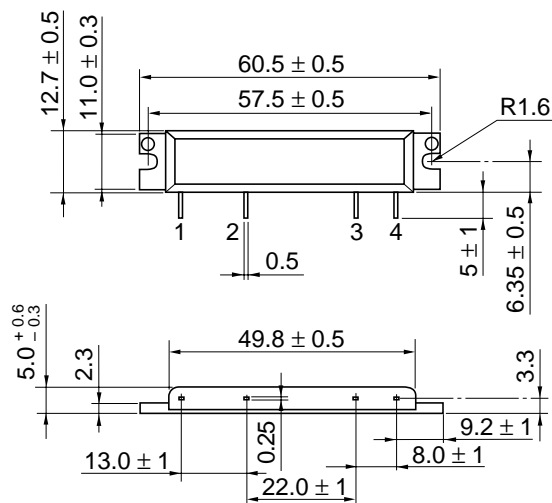






Package Dimensions

Unit: mm



Hitachi Code	RF-B2
JEDEC	—
EIAJ	—
Weight (reference value)	16 g

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HITACHI

Hitachi, Ltd.

Semiconductor & Integrated Circuits.
Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan
Tel: Tokyo (03) 3270-2111 Fax: (03) 3270-5109

URL North America : <http://semiconductor.hitachi.com/>
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For further information write to:

Hitachi Semiconductor
(America) Inc.
179 East Tasman Drive,
San Jose, CA 95134
Tel: <1> (408) 433-1990
Fax: <1> (408) 433-0223

Hitachi Europe GmbH
Electronic components Group
Dornacher Straße 3
D-85622 Feldkirchen, Munich
Germany
Tel: <49> (89) 9 9180-0
Fax: <49> (89) 9 29 30 00

Hitachi Europe Ltd.
Electronic Components Group.
Whitebrook Park
Lower Cookham Road
Maidenhead
Berkshire SL6 8YA, United Kingdom
Tel: <44> (1628) 585000
Fax: <44> (1628) 778322

Hitachi Asia Pte. Ltd.
16 Collyer Quay #20-00
Hitachi Tower
Singapore 049318
Tel: 535-2100
Fax: 535-1533

Hitachi Asia Ltd.
Taipei Branch Office
3F, Hung Kuo Building, No.167,
Tun-Hwa North Road, Taipei (105)
Tel: <886> (2) 2718-3666
Fax: <886> (2) 2718-8180

Hitachi Asia (Hong Kong) Ltd.
Group III (Electronic Components)
7/F., North Tower, World Finance Centre,
Harbour City, Canton Road, Tsim Sha Tsui,
Kowloon, Hong Kong
Tel: <852> (2) 735 9218
Fax: <852> (2) 730 0281
Telex: 40815 HITEC HX

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