# PF01412A

MOS FET Power Amplifier Module
for E-GSM Handy Phone

HITACHI

ADE-208-477C (Z)
4th Edition
Jan. 2001

## Application

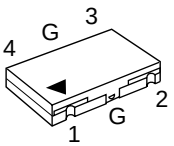
- For GSM class4 890 MHz to 915 MHz
- For 5.5 V nominal DC/DC converter use

## Features

- High gain 3stage amplifier : 0 dBm input
- Lead less thin & Small package : 2 mm Max, 0.2 cc
- High efficiency : 45 % Typ at 3.8 W
- Wide gain control range : 90 dB Typ

## Pin Arrangement

• RF-K




1: Pin
2: Vapc
3: Vdd
4: Pout
G: GND

## Absolute Maximum Ratings (Tc = 25°C)

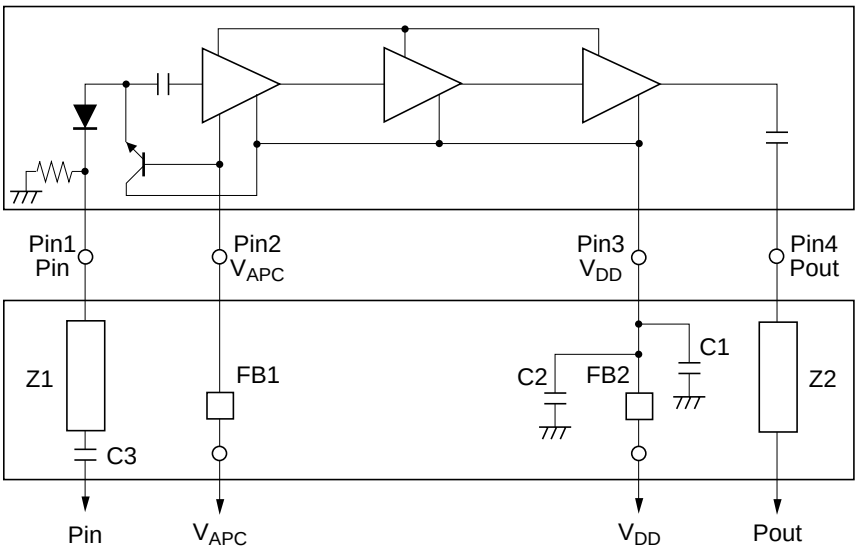
| Item | Symbol | Rating | Unit |
|---|---|---|---|
| Supply voltage | $V_{DD}$ | 10 | V |
| Supply current | $I_{DD}$ | 3 | A |
| $V_{APC}$ voltage | $V_{APC}$ | 4 | V |
| Input power | Pin | 10 | mW |
| Operating case temperature | Tc (op) | –30 to +100 | °C |
| Storage temperature | Tstg | –30 to +100 | °C |
| Output power | Pout | 6 | W |

Hitachi semiconductor

## Electrical Characteristics (Tc = 25°C)

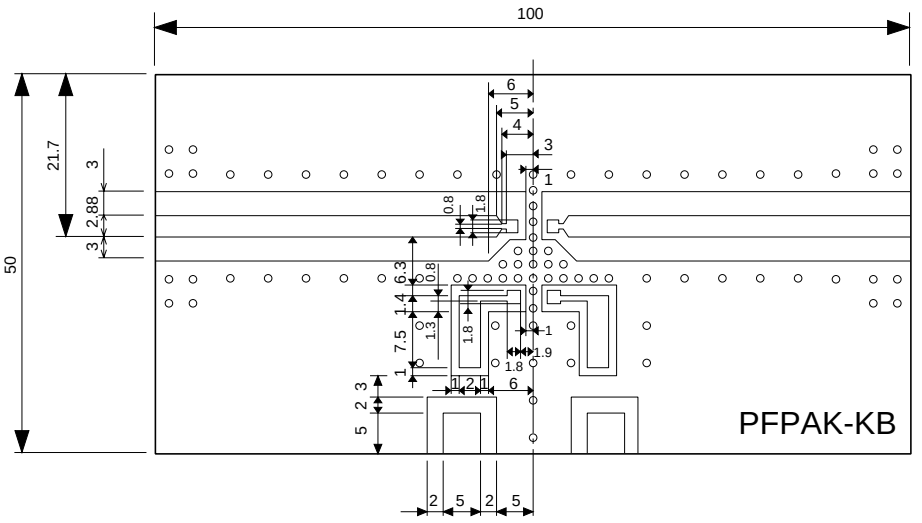
| Item | Symbol | Min | Typ | Max | Unit | Test Condition |
|---|---|---|---|---|---|---|
| Frequency range | f | 890 | — | 915 | MHz | |
| Control voltage range | $V_{APC}$ | 0.5 | — | 3.0 | V | |
| Drain cutoff current | $I_{DS}$ | — | — | 100 | μA | $V_{DD}$ = 10V, $V_{APC}$ = 0V |
| Total efficiency | $\eta_T$ | 40 | 45 | — | % | Pin = 1mW, $V_{DD}$ = 5.5V, |
| 2nd harmonic distortion | 2nd H.D. | — | –45 | –35 | dBc | Pout = 3.8W, Vapc = controlled |
| 3rd harmonic distortion | 3rd H.D. | — | –45 | –35 | dBc | $R_L$ = Rg = 50Ω, Tc = 25°C |
| Input VSWR | VSWR (in) | — | 1.5 | 3 | — | |
| Output power (1) | Pout (1) | 3.8 | 4.5 | — | W | Pin = 1mW, $V_{DD}$ = 5.5V, $V_{APC}$ = 3.0V, $R_L$ = Rg = 50Ω, Tc = 25°C |
| Output power (2) | Pout (2) | 2.5 | 3.2 | — | W | Pin = 1mW, $V_{DD}$ = 5.0V, $V_{APC}$ = 3.0V, $R_L$ = Rg = 50Ω, Tc = 80°C |
| Isolation | — | — | –50 | –40 | dBm | Pin = 1mW, $V_{DD}$ = 5.5V, $V_{APC}$ = 0.5V, $R_L$ = Rg = 50Ω, Tc = 25°C |
| Switching time | $t_r$, $t_f$ | — | 1 | 2 | μs | Pin = 1mW, $V_{DD}$ = 5.5V, Pout = 3.8W, $R_L$ = Rg = 50Ω, Tc = 25°C |
| Stability & Load VSWR tolerance | — | No parasitic oscillation & No degradation | | | — | Pin = 1mW, $V_{DD}$ = 5 to 6V, Pout ≤ 3.8W, Vapc ≤ 3V GSM pulse. Rg = 50Ω, t = 20sec., Tc = 25°C, Output VSWR = 6 : 1 All phases |

## Internal Diagram and External Circuit



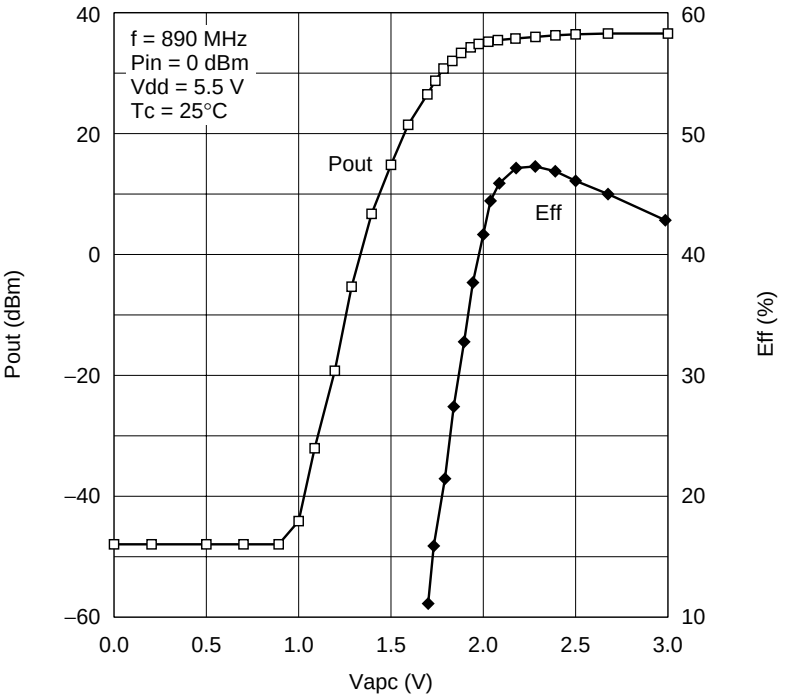

C1 = 0.01 μF (Ceramic chip capacitor)
C2 = 220 μF (Aluminum Electrolyte Capacitor)
C3 = 1000 pF (Ceramic chip capacitor)
FB = Ferrite bead BLO1RN1-A62-001 (Manufacture: MURATA) or equivalent
Z1 = Z2 = 50 Ω (Microstrip line)

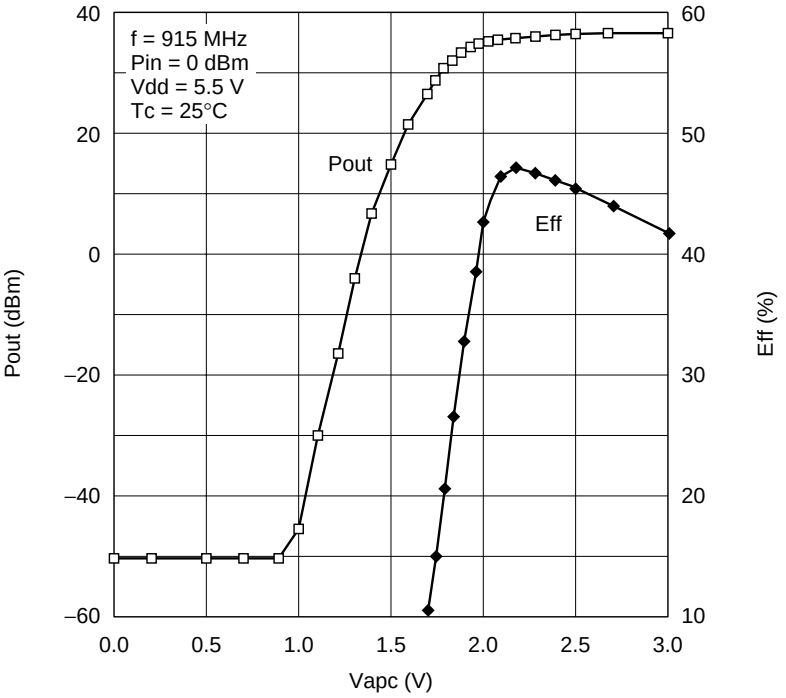
## Test Fixture Pattern

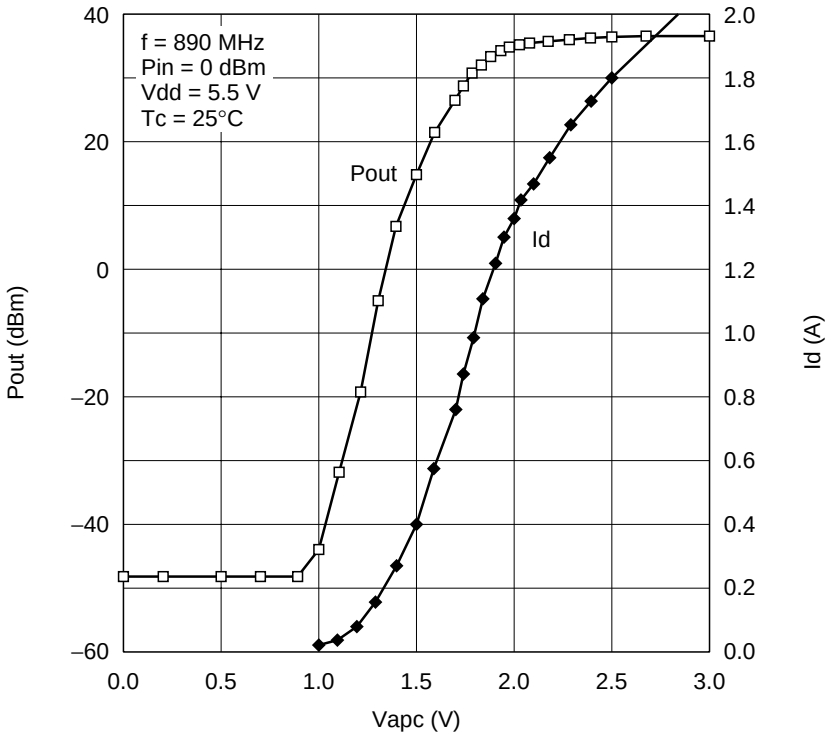


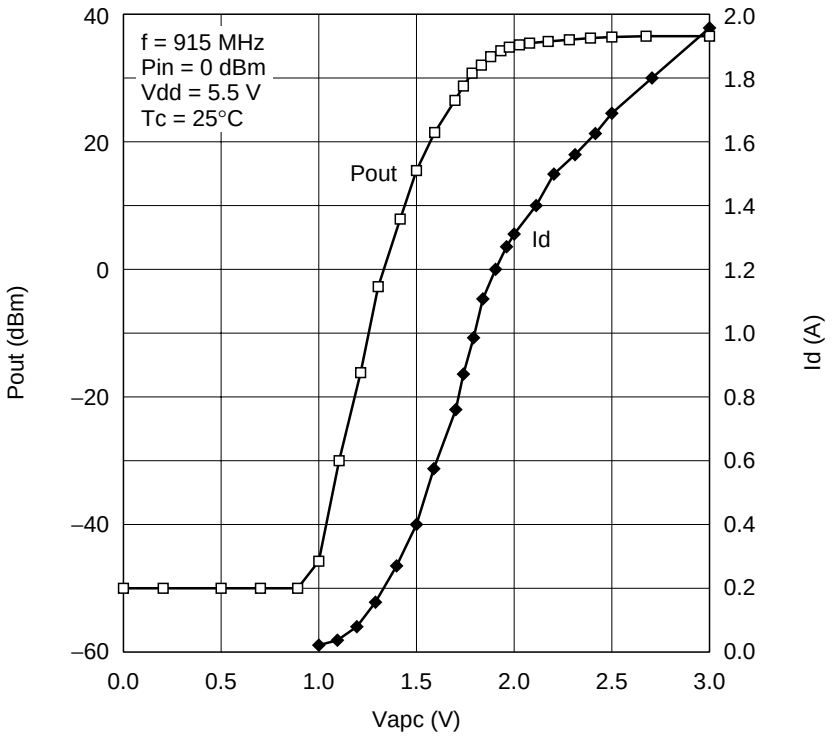

SCALE : 1/1
Grass Epoxy Double sided P.C.B (t = 1.6mm, εr = 4.8)
UNIT : mm

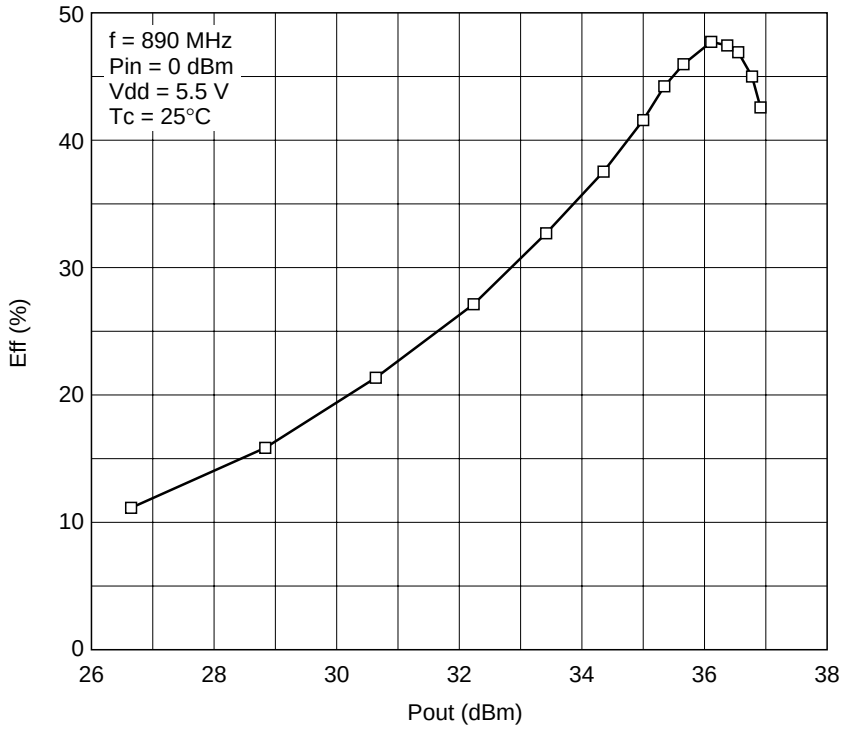
## Characteristic Curves

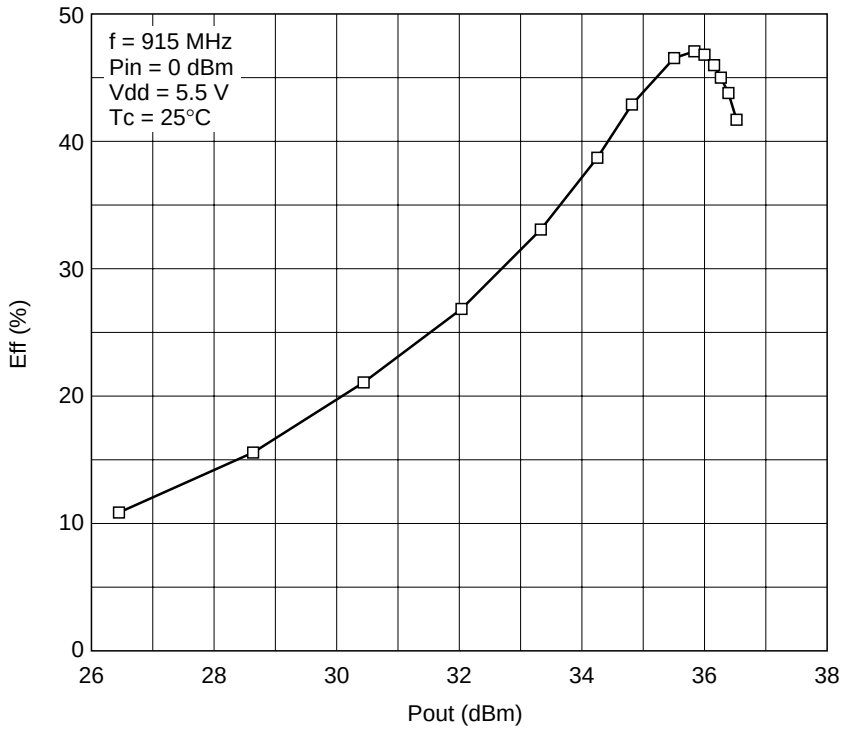



f = 890 MHz
Pin = 0 dBm
Vdd = 5.5 V
Tc = 25°C
Pout
Id
Pout (dBm)
Id (A)
Vapc (V)
40
20
0
–20
–40
–60
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0


f = 915 MHz
Pin = 0 dBm
Vdd = 5.5 V
Tc = 25°C
Pout
Id
Pout (dBm)
Id (A)
Vapc (V)
40
20
0
–20
–40
–60
2.0
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.5
1.0
1.5
2.0
2.5
3.0


f = 890 MHz
Pin = 0 dBm
Vdd = 5.5 V
Tc = 25°C
Eff (%)
Pout (dBm)
0
10
20
30
40
50
26
28
30
32
34
36
38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Pout (dBm)
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10
20
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32
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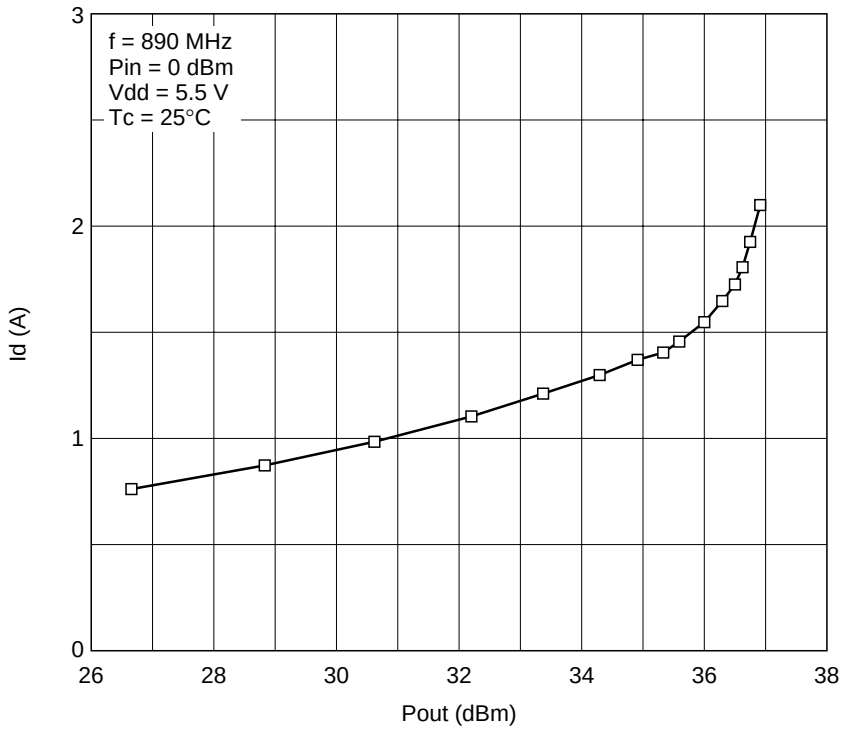
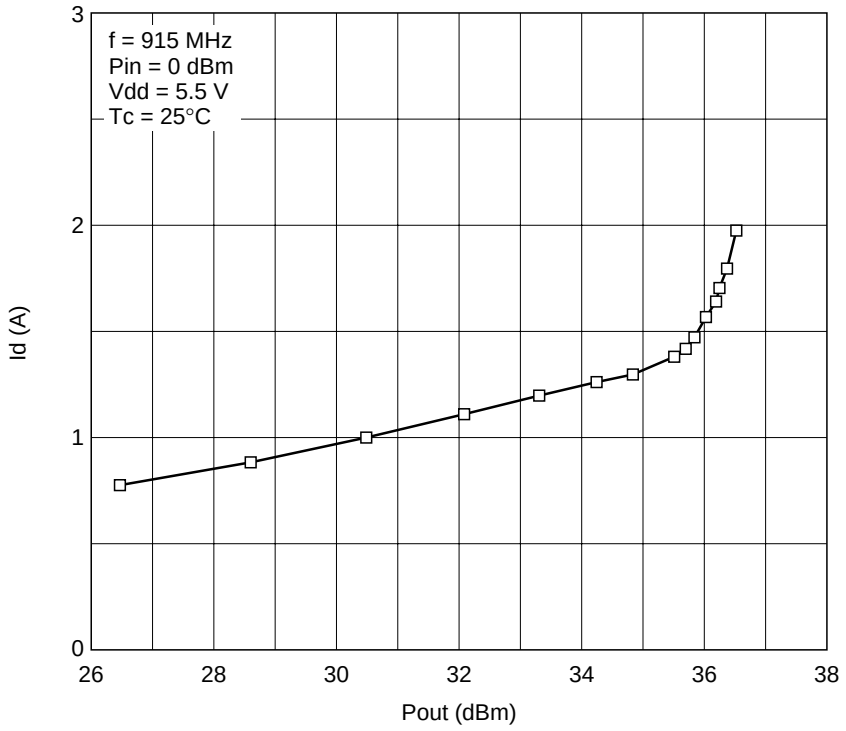
38


f = 890 MHz
Pin = 0 dBm
Vdd = 5.5 V
Tc = 25°C
Id (A)
Pout (dBm)
0
1
2
3
26
28
30
32
34
36
38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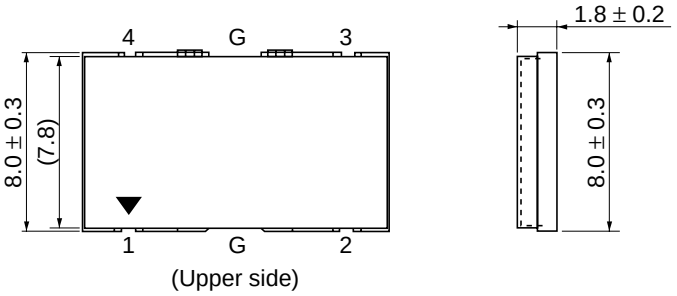
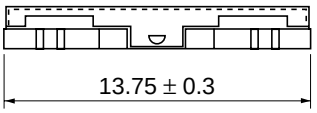
Pin = 0 dBm
Vdd = 5.5 V
Tc = 25°C
Id (A)
Pout (dBm)
0
1
2
3
26
28
30
32
34
36
38

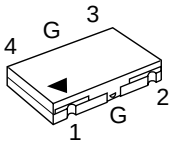
## Package Dimensions

Unit: mm




(Upper side)

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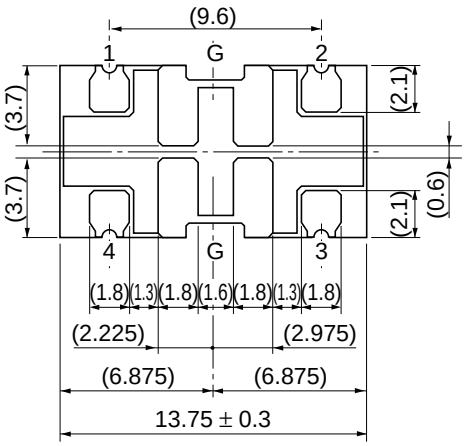


(Bottom side)

Remark:
Coplanarity of bottom side of terminals are less than 0 ± 0.1mm.

| | |
|---|---|
| Hitachi Code | RF-K |
| JEDEC | — |
| EIAJ | — |
| Mass (reference value) | — |

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