

MGF7170AC

UHF BAND GaAs POWER AMPLIFIER

Technical Note

Specifications are subject to change without notice.

DESCRIPTION

The MGF7170AC is a monolithic microwave integrated circuit for use in CDMA base handheld phone.

FEATURES

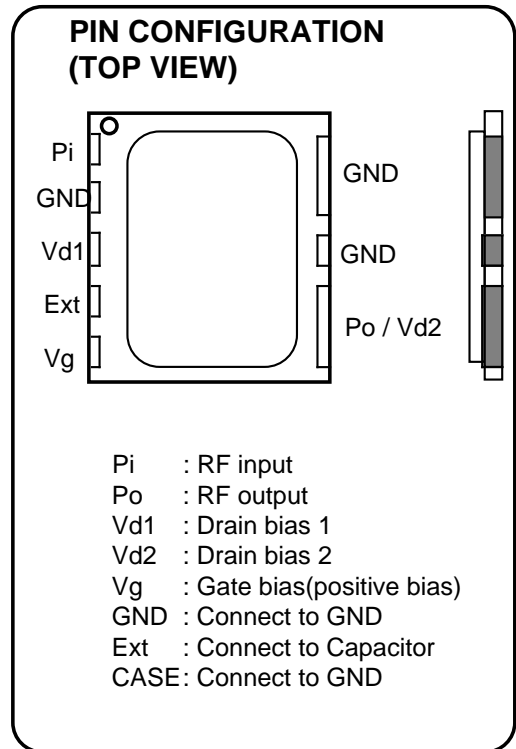
- Low voltage operation :
Vd=3.0V
- High output power :
Po=28dBm typ. @f=1.715~1.78GHz
- Low distortion :
ACP=-46dBc max. @Po=28dBm
- High efficiency :
Id=520mA typ. @Po=28dBm
- Small size :
7.0 x 6.1 x 1.1 mm
- Single voltage operation (NVG include)
- Surface mount package
- 2 Stage Amplifier
- External matching circuit is required

APPLICATION

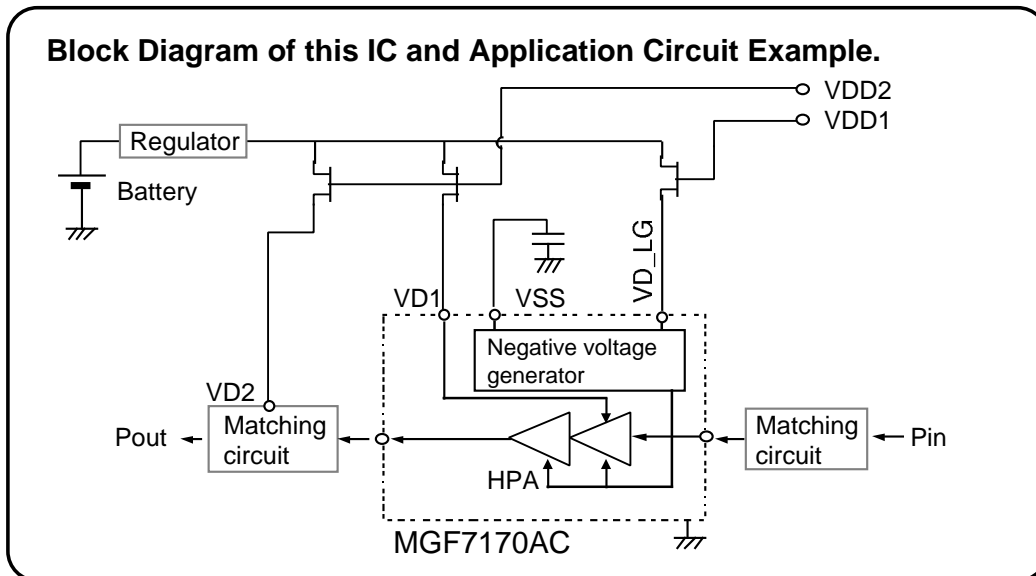
1.9GHz band handheld phone

QUALITY GRADE

GG



ES1:different pin configuration



*Mitsubishi Electric Corporation puts the maximum effort into making semiconductor products better and reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary, circuits, (ii) use of non-flammable material or (iii) prevention against any malfunction or mishap.

Preliminary
information

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ABSOLUTE MAXIMUM RATINGS (Ta=25 deg.C)

| Symbol | Parameter | Ratings | Unit |
|---------|----------------------------|------------|-------|
| Vd1,Vd2 | Drain supply voltage | 6 | V |
| Vg | Gate supply voltage | 4 | V |
| Pi | Input power | 15 | dBm |
| Tc(op) | Operating case temperature | -30 ~ +85 | deg.C |
| Tstg | Storage temperature | -30 ~ +100 | deg.C |

*1.Each maximum rating is guaranteed independently.

ELECTRICAL CHARACTERISTICS (Ta=25 deg.C)

| Symbol | Parameter | Test conditions | Limits | | | Unit |
|---------|------------------------------|--|--|-----------|------|------|
| | | | MIN | TYP | MAX | |
| f | frequency | | 1715 | — | 1780 | MHz |
| Idt | Total drain current | ACP<-42dBc (1.25MHz off-set.) Vd1=Vd2=3.0V | — | 450 | — | mA |
| | | ACP<-44dBc (1.25MHz off-set.) Vd1=Vd2=3.0V | — | 480 | — | |
| | | ACP<-46dBc (1.25MHz off-set.) Vd1=Vd2=3.0V | — | 520 | — | |
| | | ACP<-44dBc (1.25MHz off-set.) Vd1=Vd2=3.3V | — | 450 | — | |
| Idle_Id | Idle current | Vg=2.6V, Po=28dBm | — | 150 | — | mA |
| | | Vg=2.9V, Po=12dBm | — | 50 | — | |
| Pout | Output power | Vd1=Vd2=3.0V, Vg=2.6V, Pin=7dBm CDMA modulated signal based on IS-95 STD. (1.2288Mbps spreading, OQPSK) | — | 28 | — | dBm |
| Ig | Gate current | | — | 10 | — | mA |
| 2sp | 2nd harmonics | | — | — | -30 | dBc |
| rin | input VSWR | | — | — | 3 | — |
| — | Damage with-standing Note | | Vd1=Vd2=3.0V, Pin=7dBm, Load VSWR=10, All phase Time=10 sec | No damage | | |
| — | Stability Note | Vd1=Vd2=3.0V, Pin=7dBm, Load VSWR=3:1, All phase | No oscillation Spurious level -60dBc | | | |

*CDMA is code division multiple Access. OQPSK is modulation method, off-set quadrature phase shift keying.

Electrical characteristics are changed by the external matching circuit.

Limits are guaranteed by using MITSUBISHI test fixture.

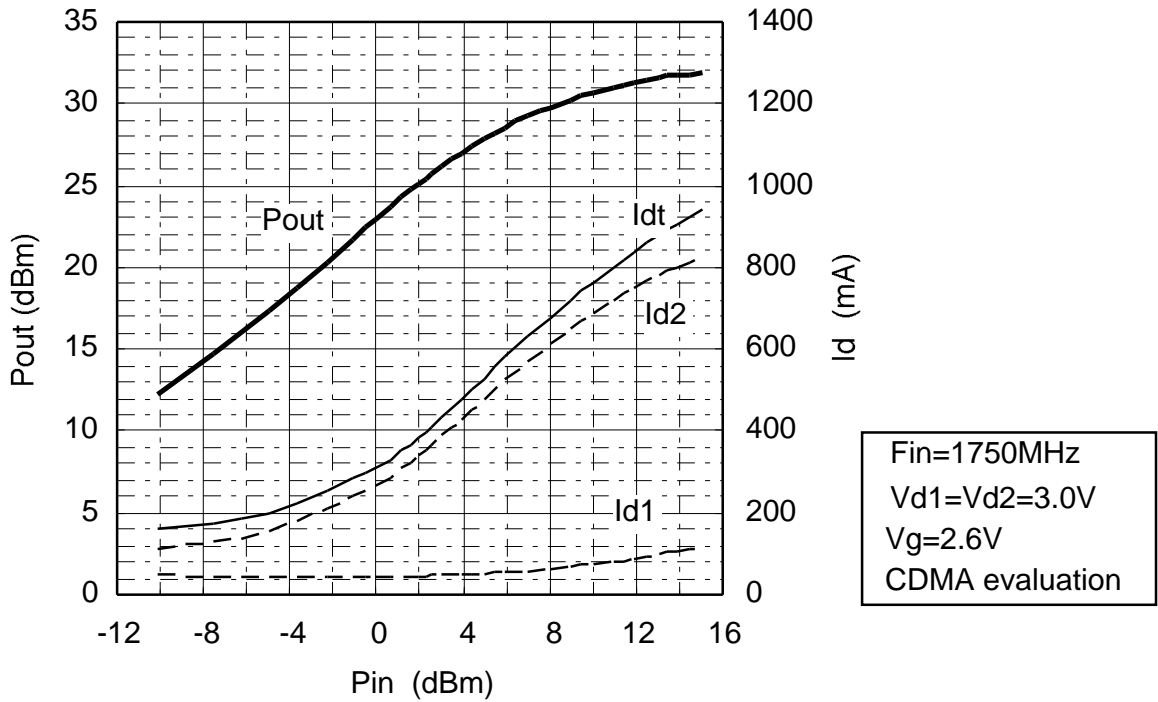
Note : Sampling inspection

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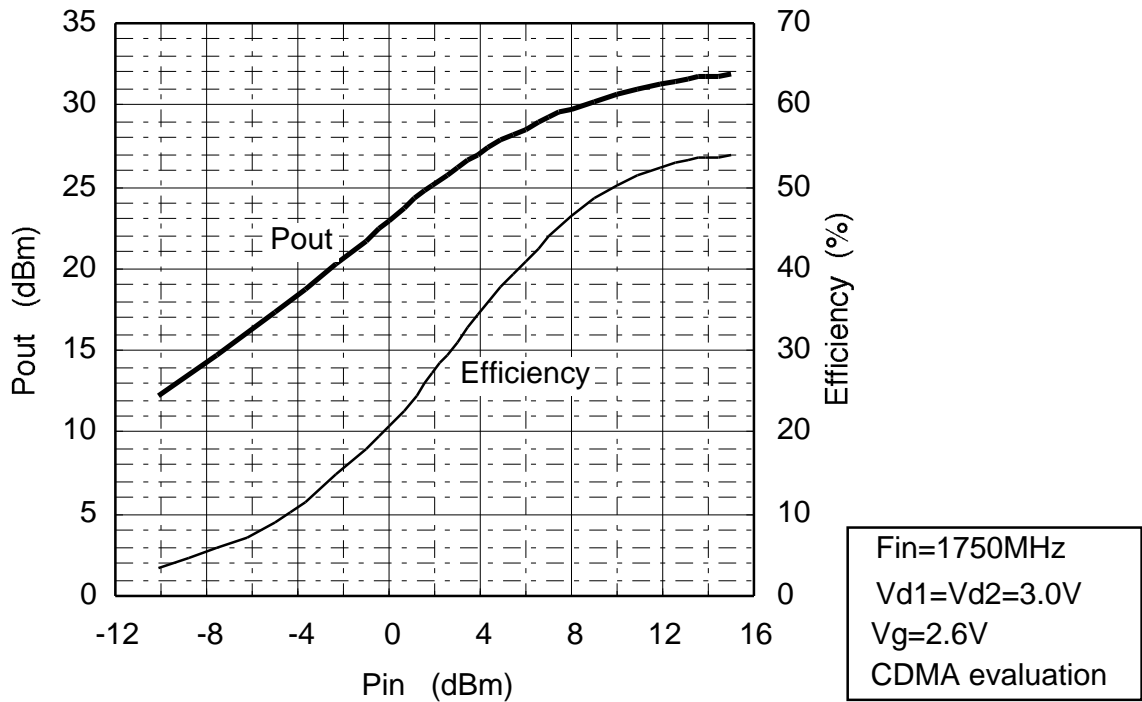
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Pin vs. Pout, Id for CDMA



Pin vs. Pout, Efficiency for CDMA

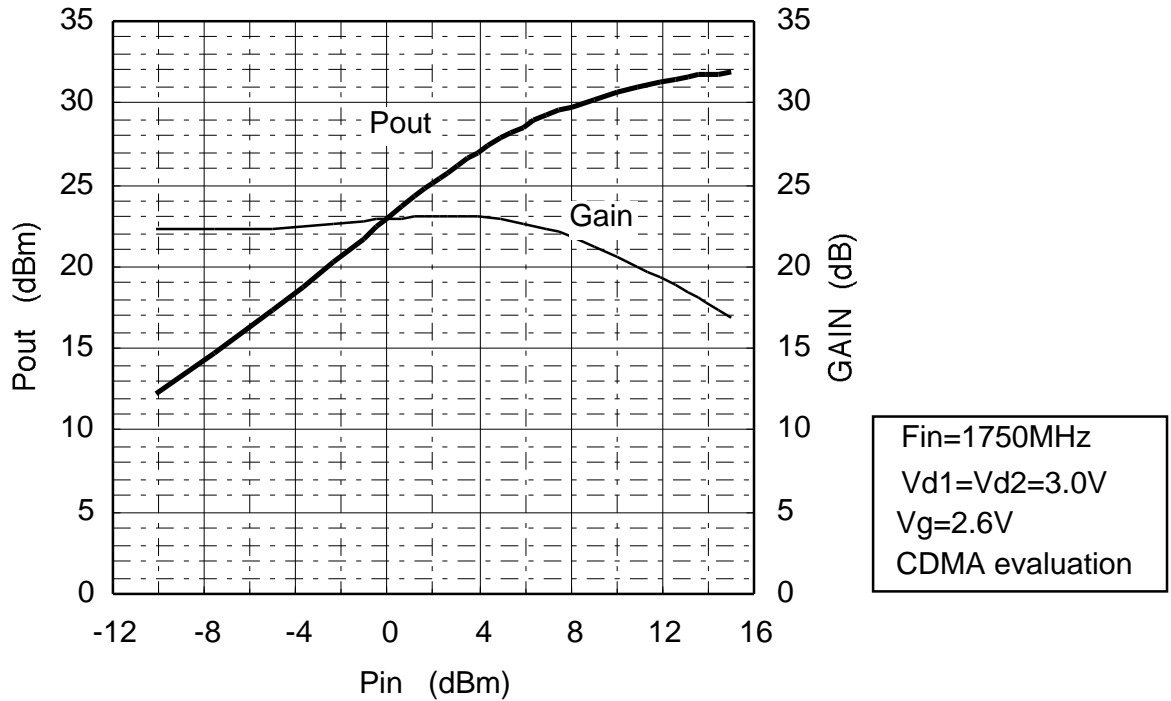


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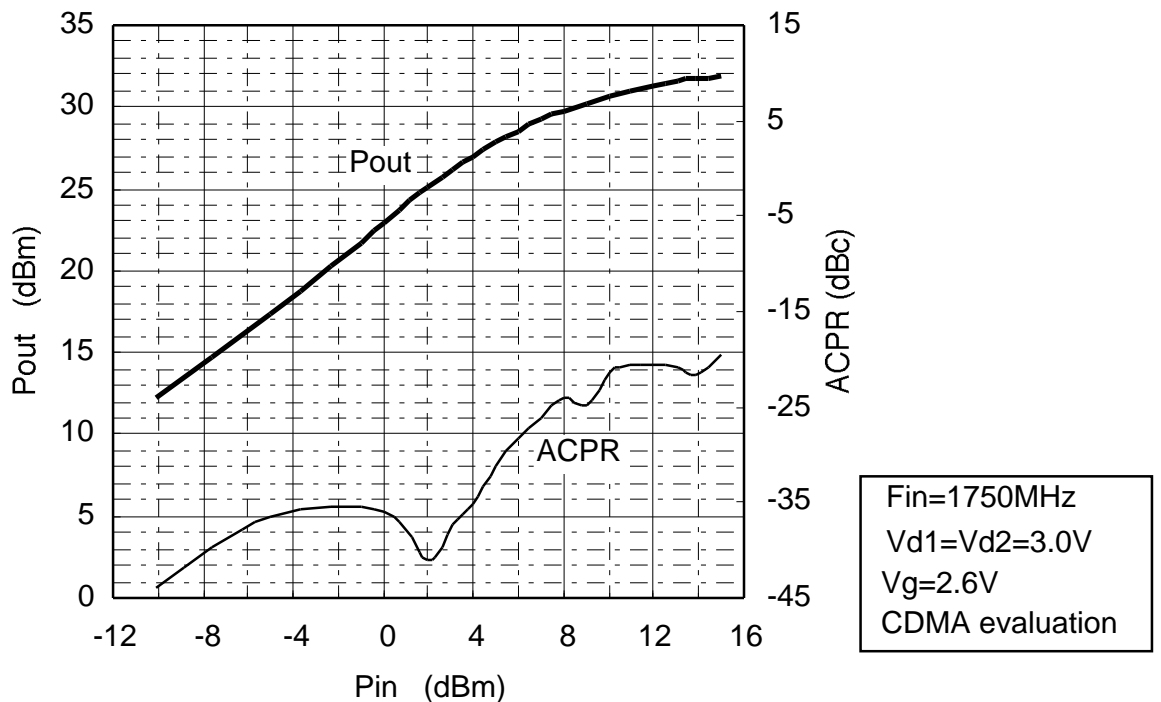
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Pin vs. Pout, Gain for CDMA



Pin vs. Pout, ACPR for CDMA

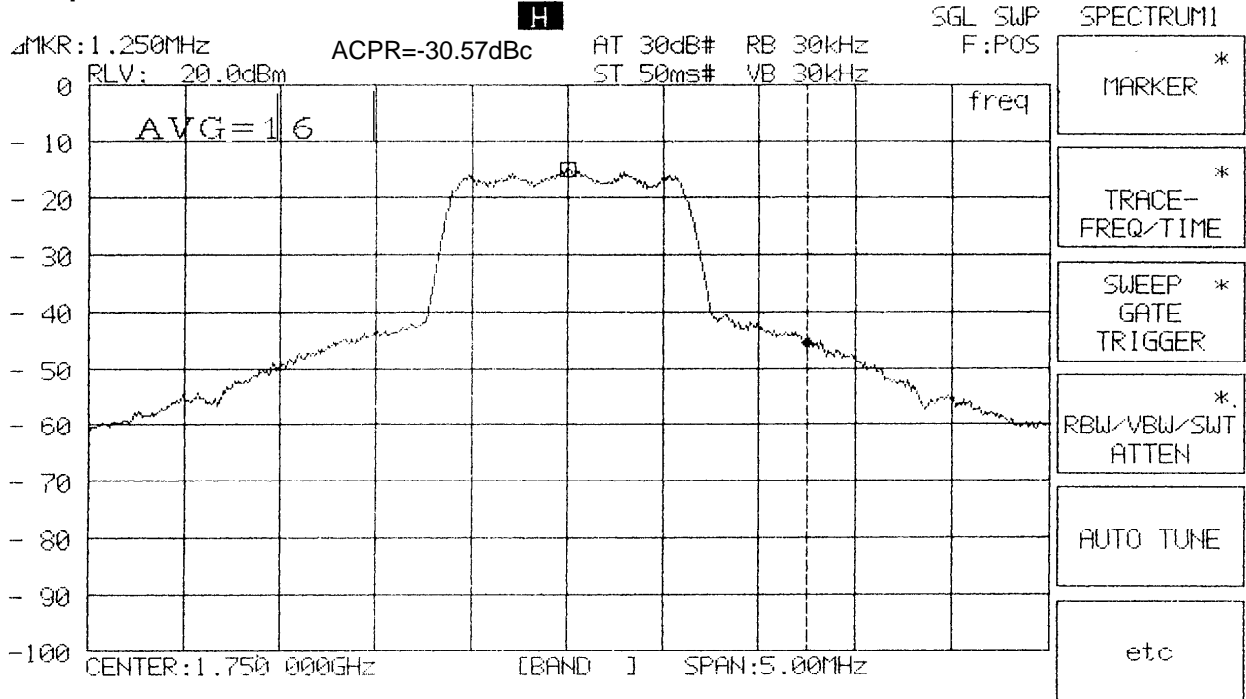


Preliminary information

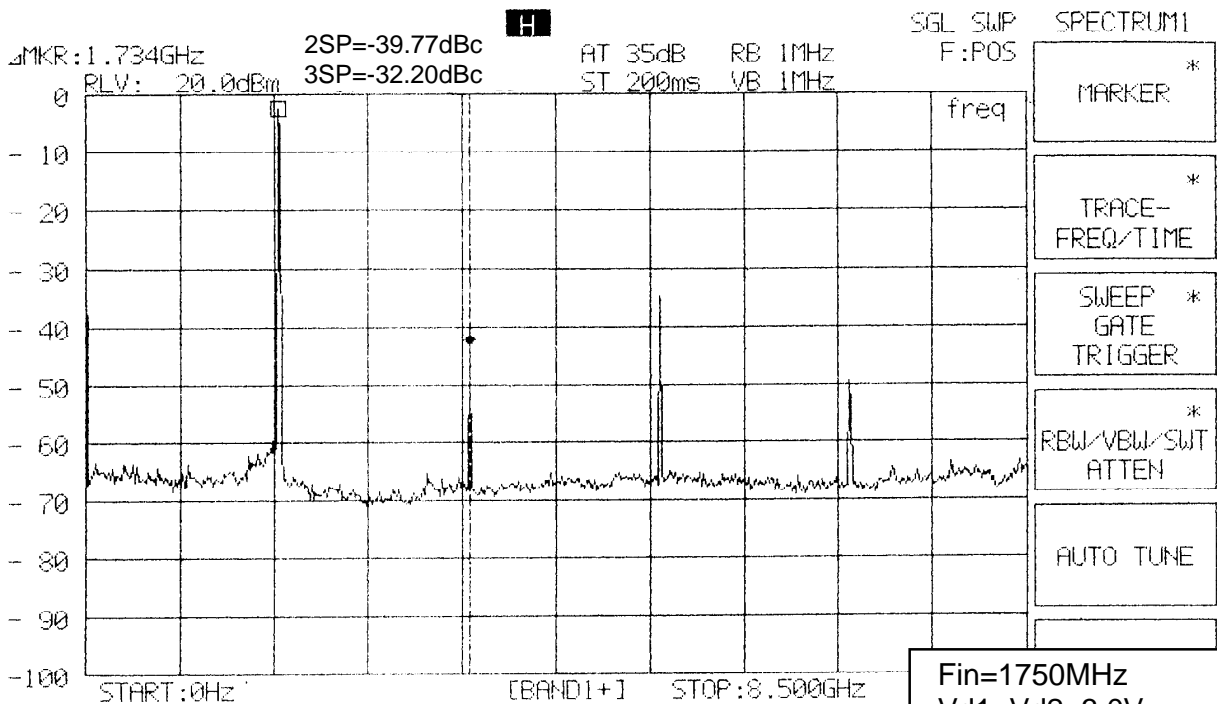
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Spectral Plot of CDMA



Harmonics



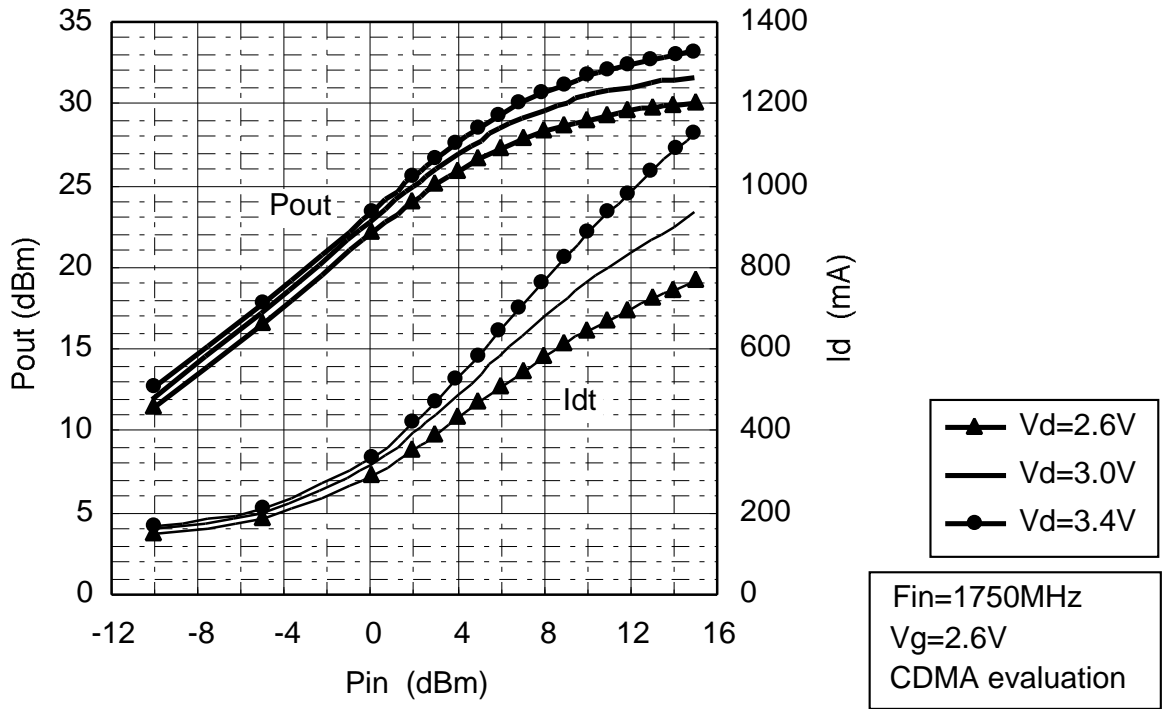
Fin=1750MHz
 Vd1=Vd2=3.0V
 Vg=2.6V
 Pout=28dBm
 CDMA evaluation

Preliminary information

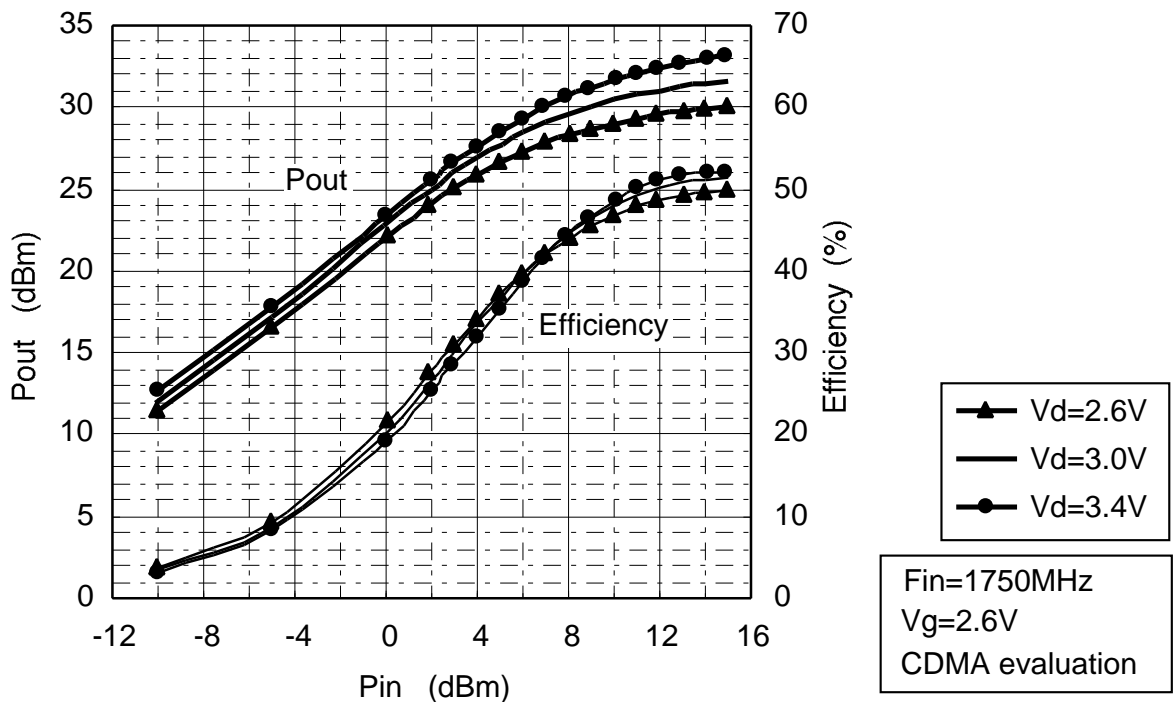
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Vd dependence of Pin vs.Pout,Idt



Vd dependence of Pin vs.Pout,Efficiency

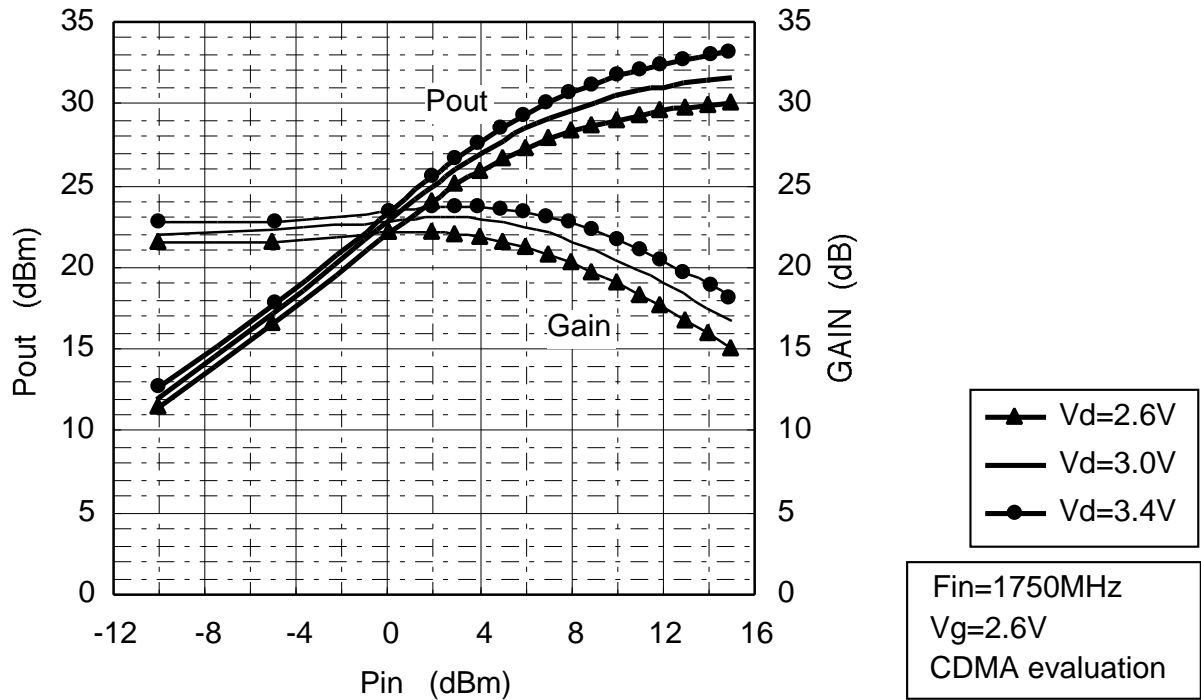


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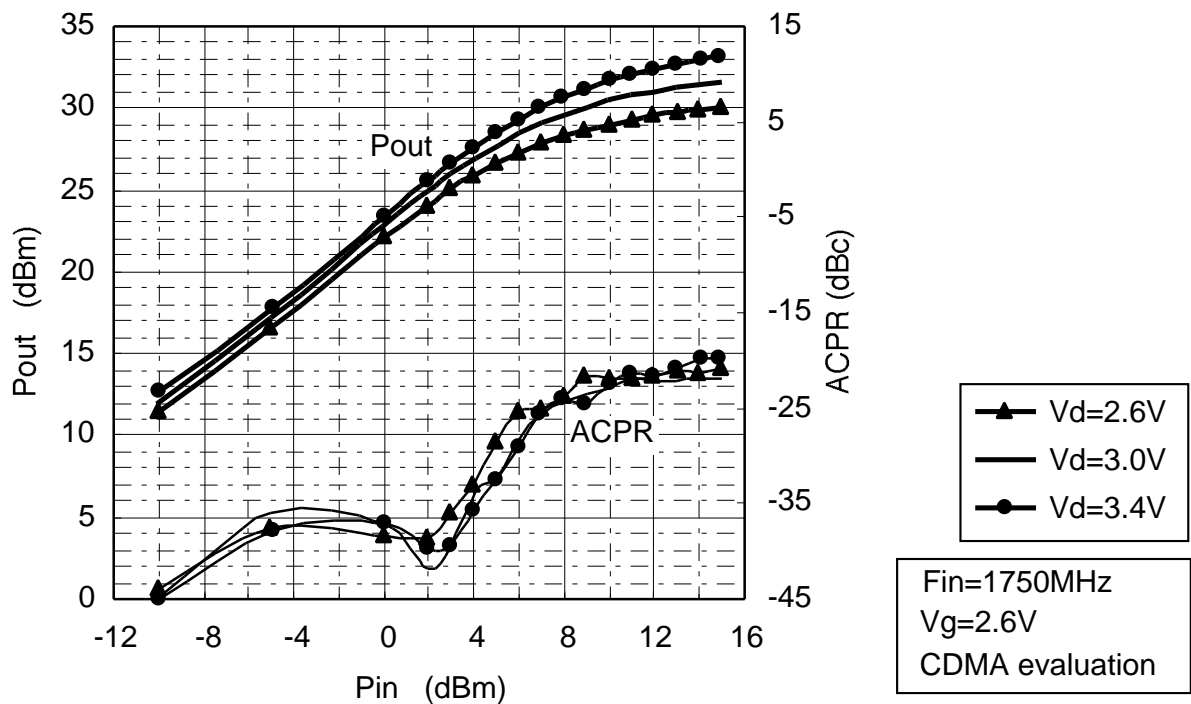
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Vd dependence of Pin vs.Pout,Gain



Vd dependence of Pin vs.Pout,ACPR

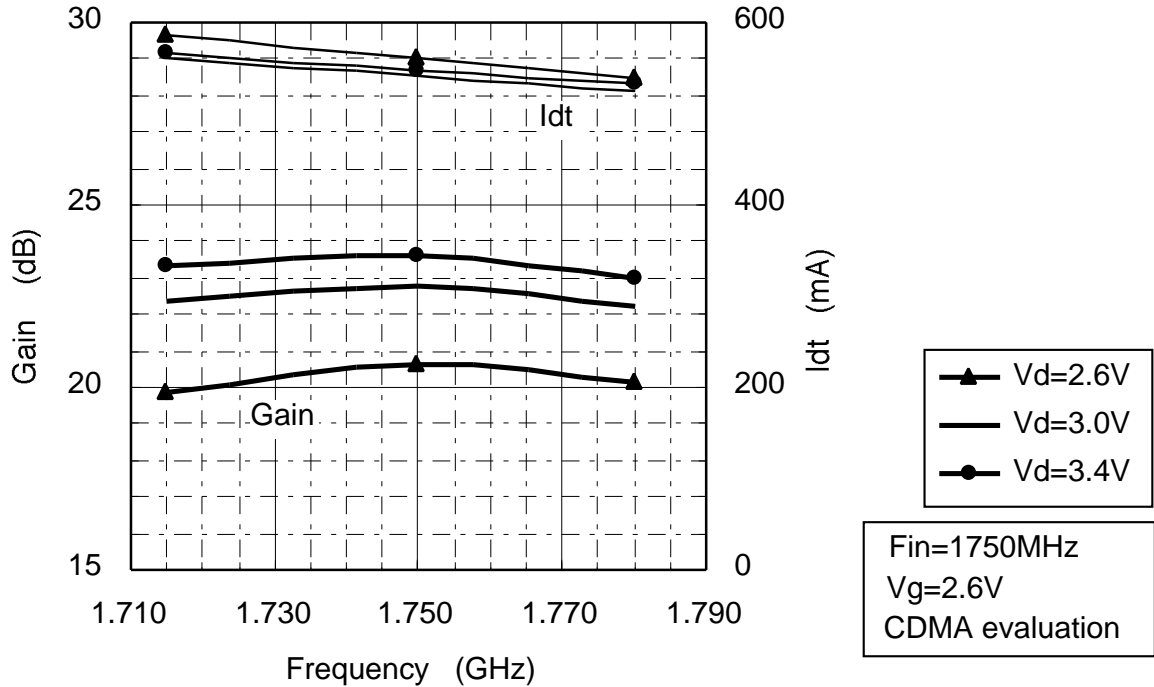


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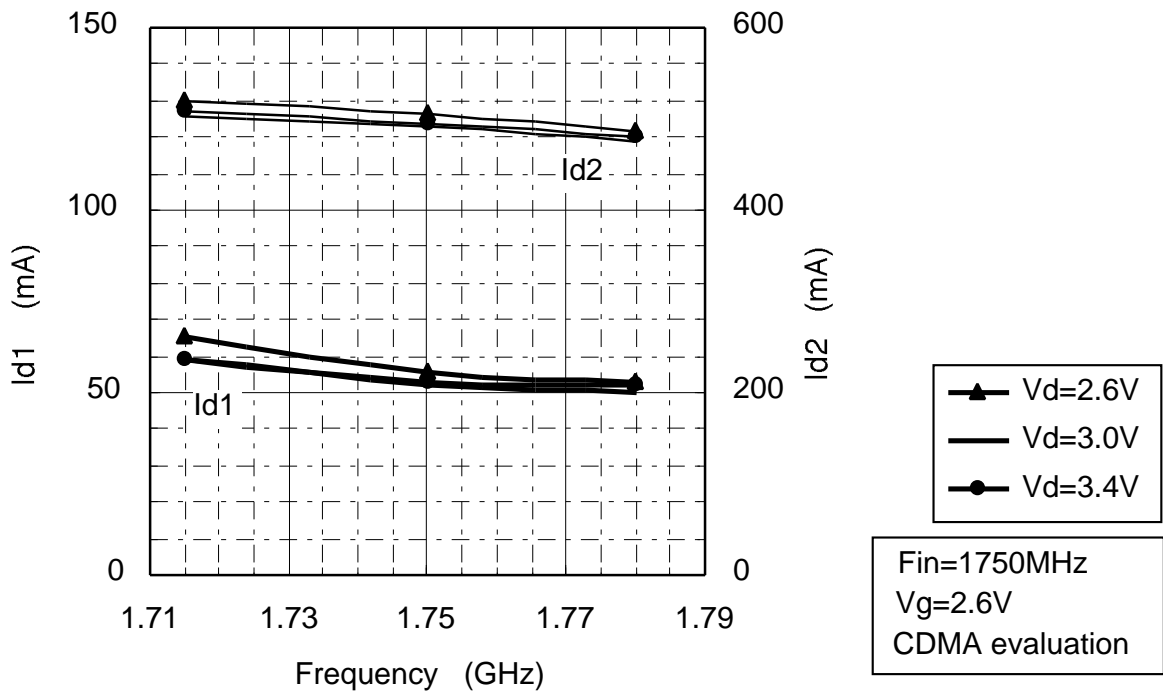
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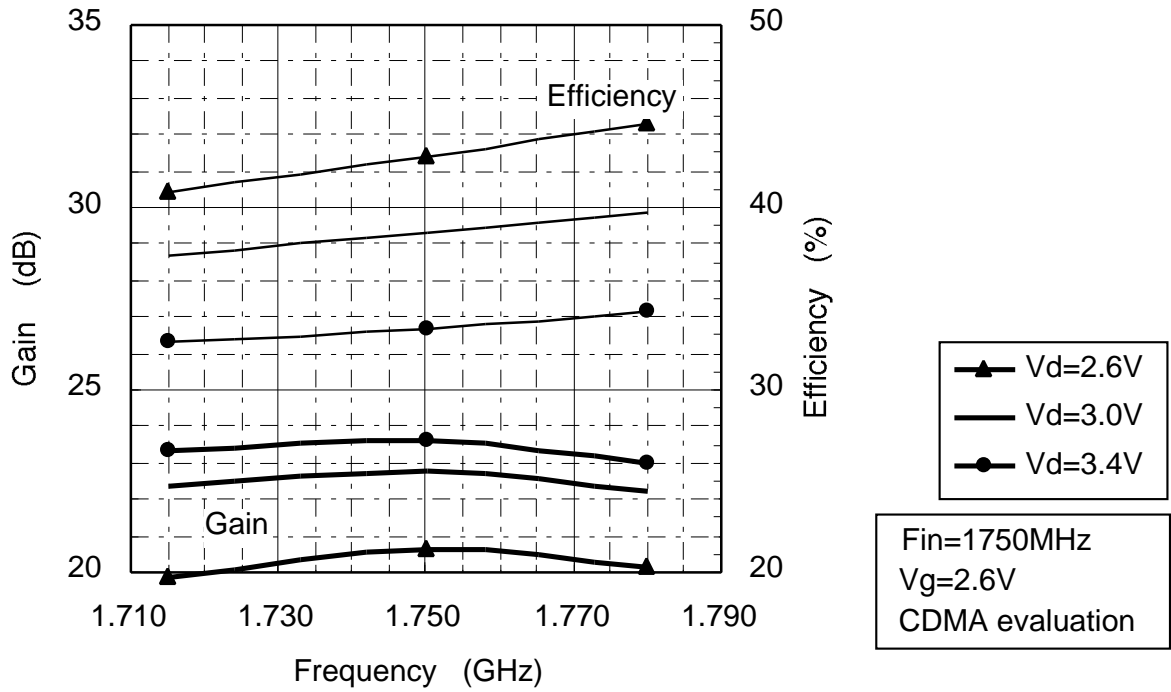
Vd dependence of Fin vs. Gain, Idt



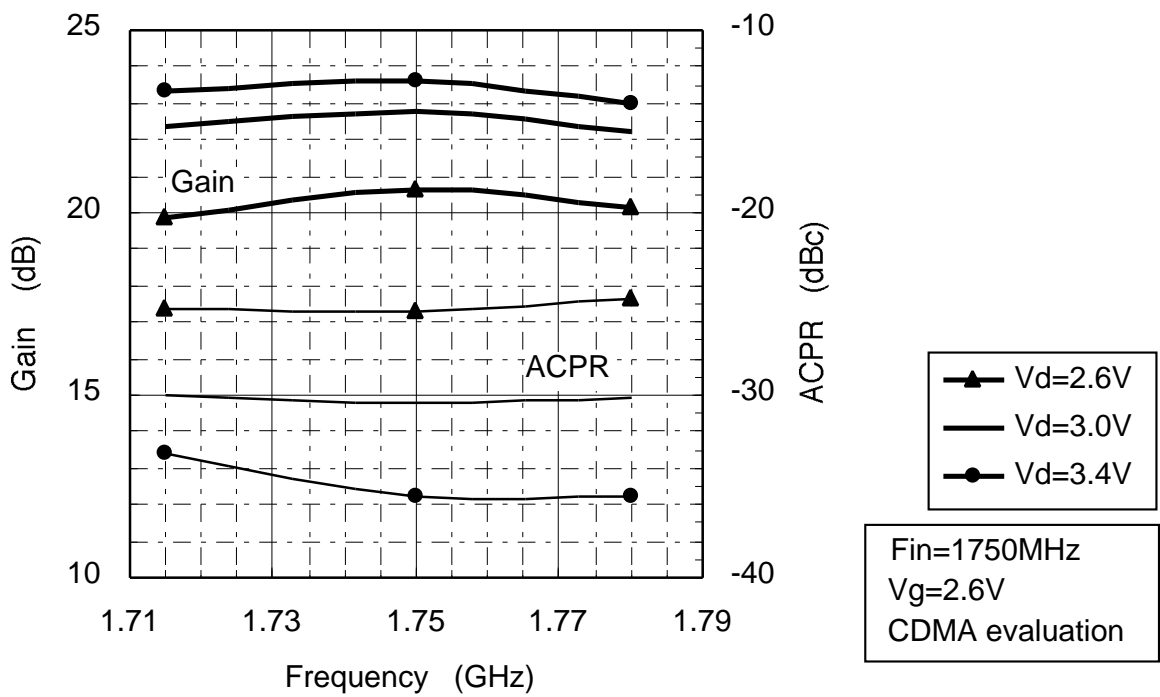
Vd dependence of Fin vs. Id1, Id2



Vd dependence of Fin vs. Gain, Efficiency



Vd dependence of Fin vs. Gain, ACPR

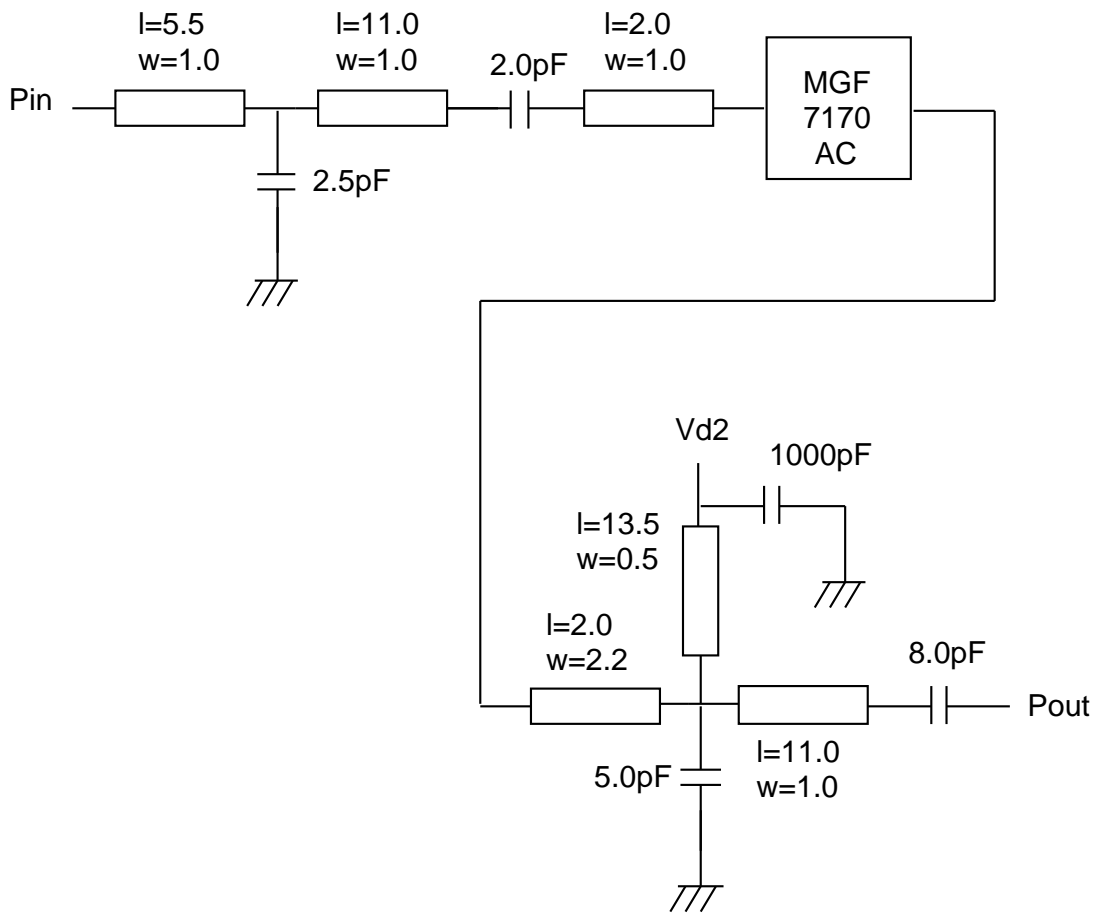


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Equivalent Circuit of Test Board for CDMA(1.715-1.78GHz): ES1



Unit:mm

SUB. data

Er=4.8

H=600 μm

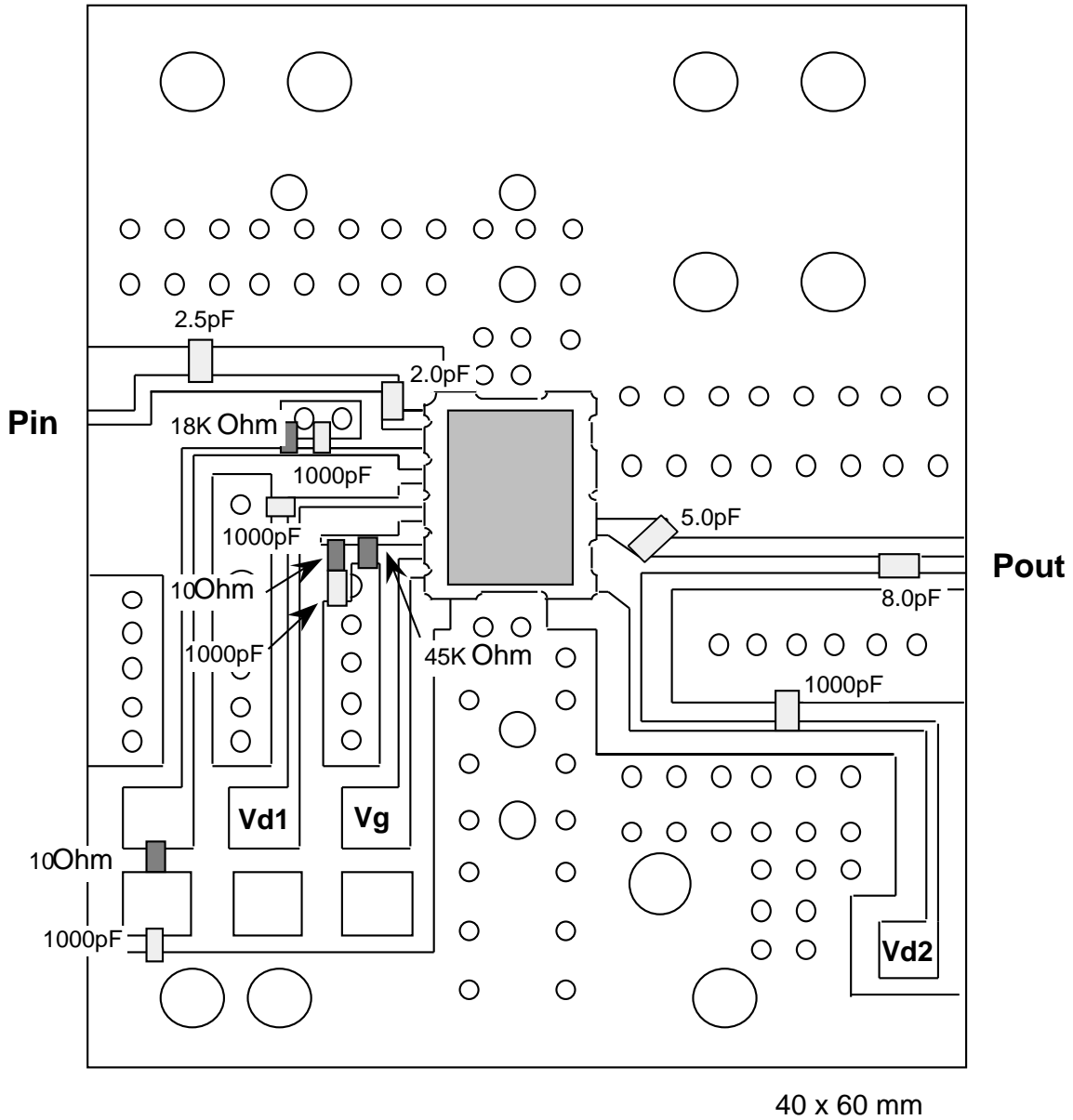
Metal T=43 μm

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Test Circuit Board for CDMA(1.715-1.78GHz): ES1

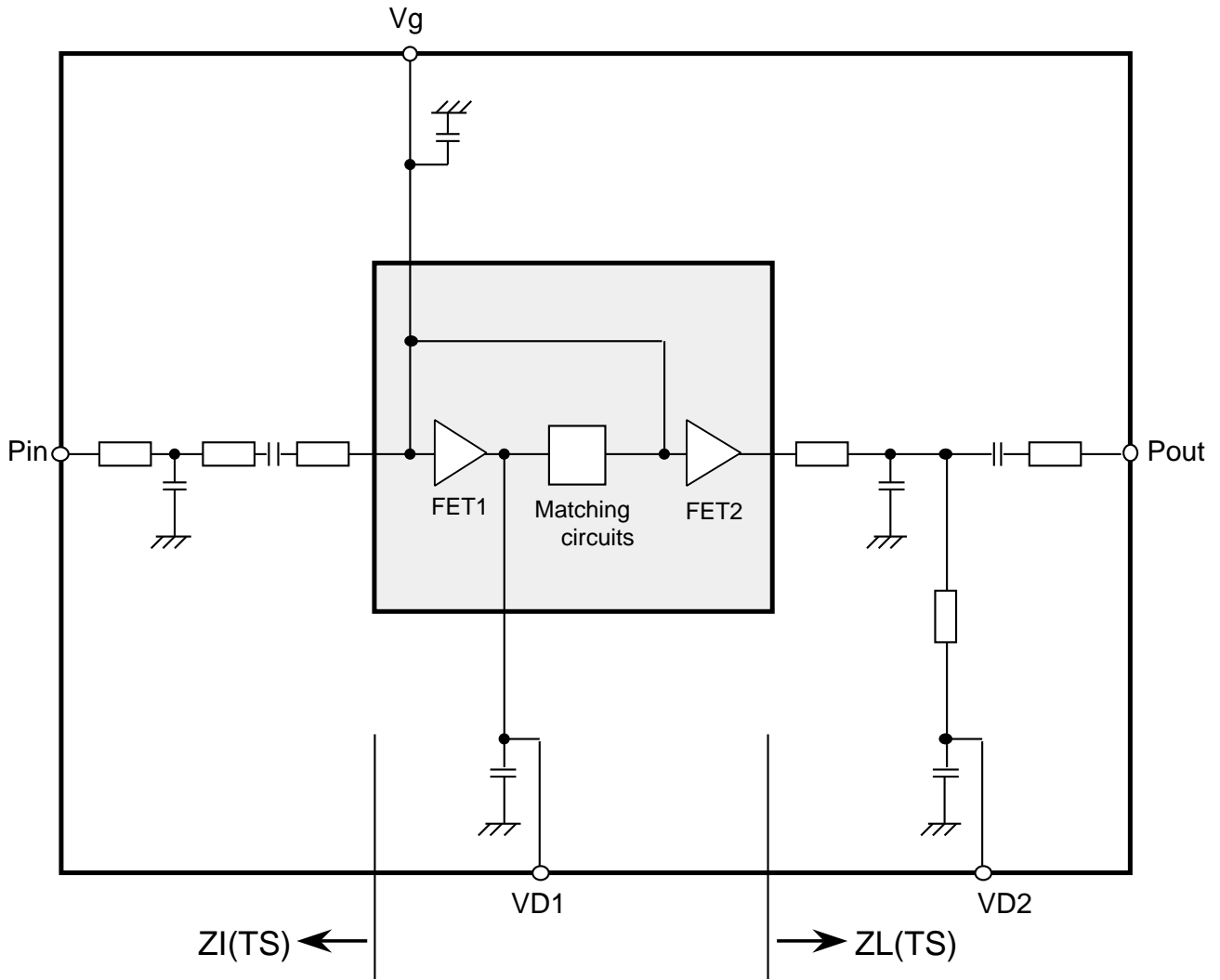


SUB. data
ER=4.8
H=600um
Metal T=43um

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Equivalent circuit of MGF7170AC with our test board

- : MGF7170AC(Ceramic package)
- : our test board($\epsilon_r=4.8, t=0.6\text{mm}$)

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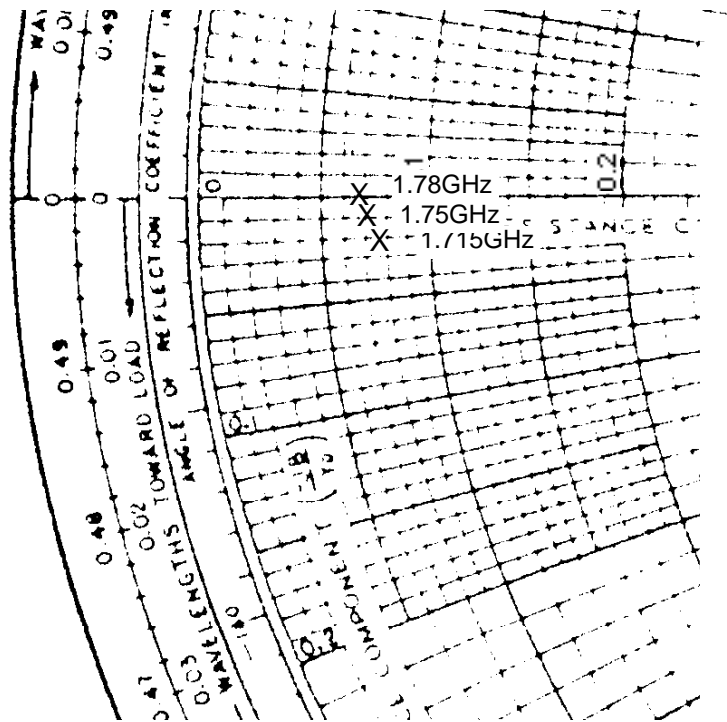
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Input/Output Impedance (@1.715-1.78GHz) : ES1

$$\begin{aligned} ZI(ES1) &= 8.7 - j18.3 () f=1.715\text{GHz} \\ &8.6 - j16.5 () f=1.75\text{GHz} \\ &8.5 - j15.0 () f=1.78\text{GHz} \end{aligned}$$

$$\begin{aligned} ZL(ES1) &= 3.8 - j1.1 () f=1.715\text{GHz} \\ &3.5 - j0.4 () f=1.75\text{GHz} \\ &3.3 + j 0.2 () f=1.78\text{GHz} \end{aligned}$$



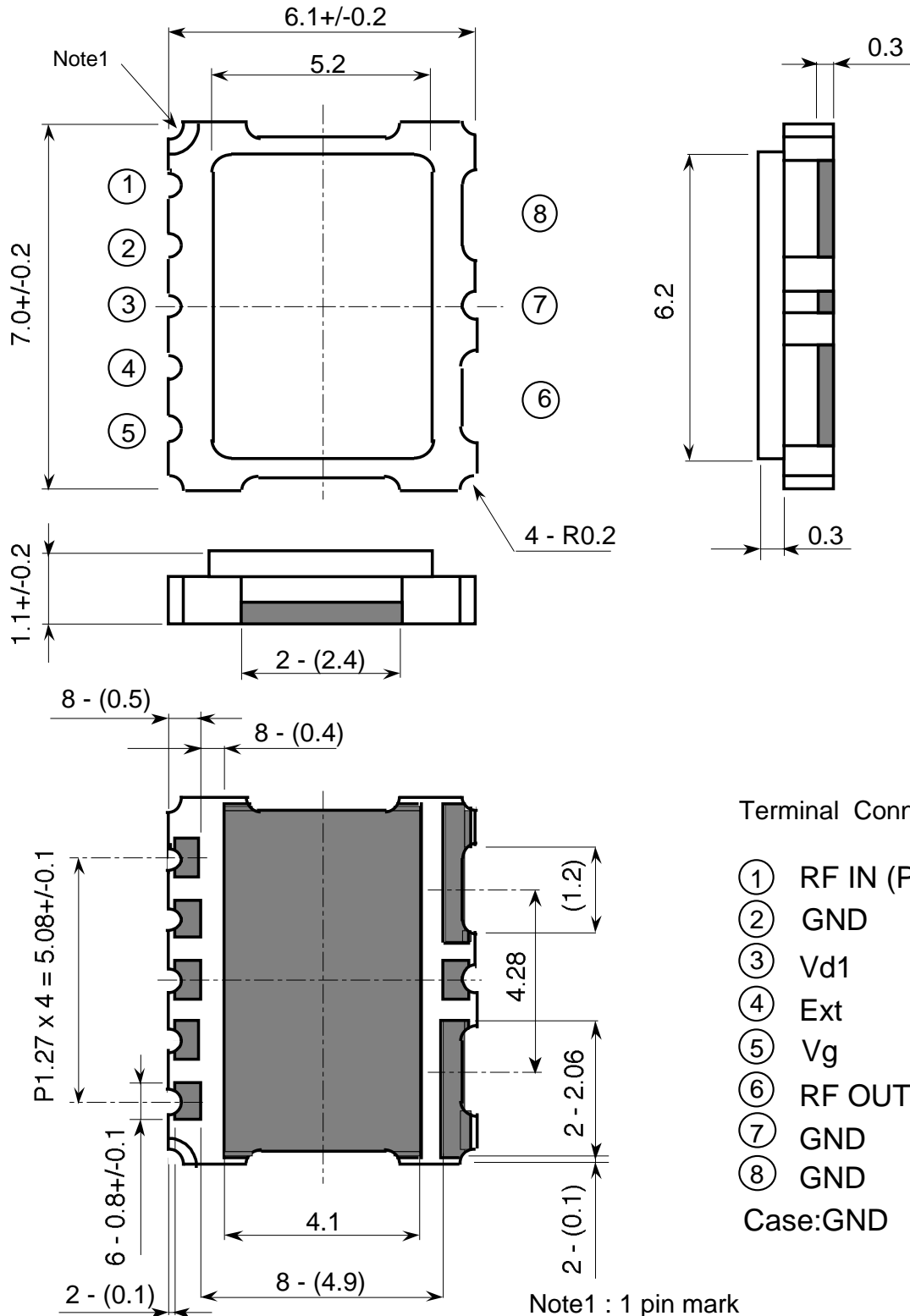
Conditions;
 Vd1=Vd2=3.0V
 Vg=2.6V
 Pout=28dBm

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OUTLINE DRAWING Unit : mm

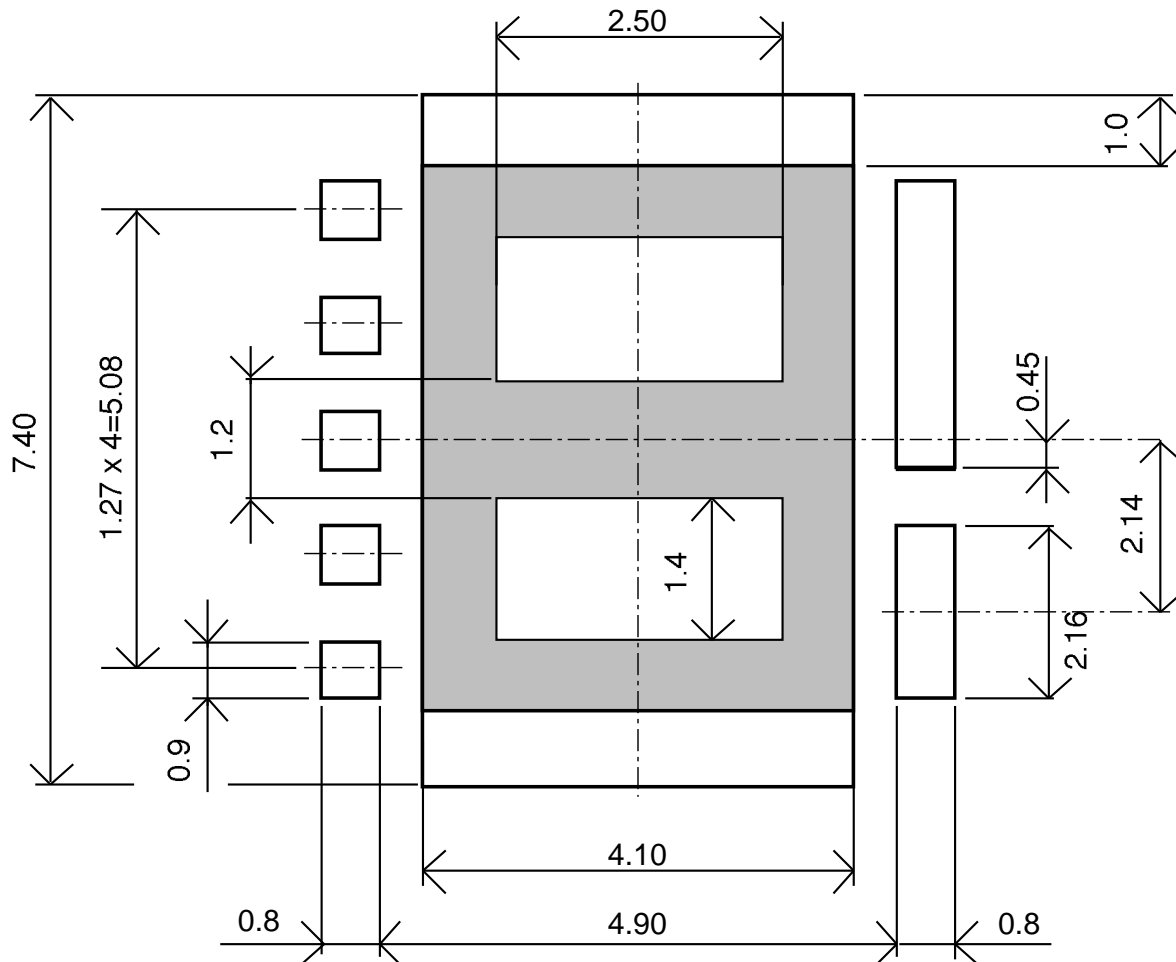


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Recommended Mount Pad



Unit:mm

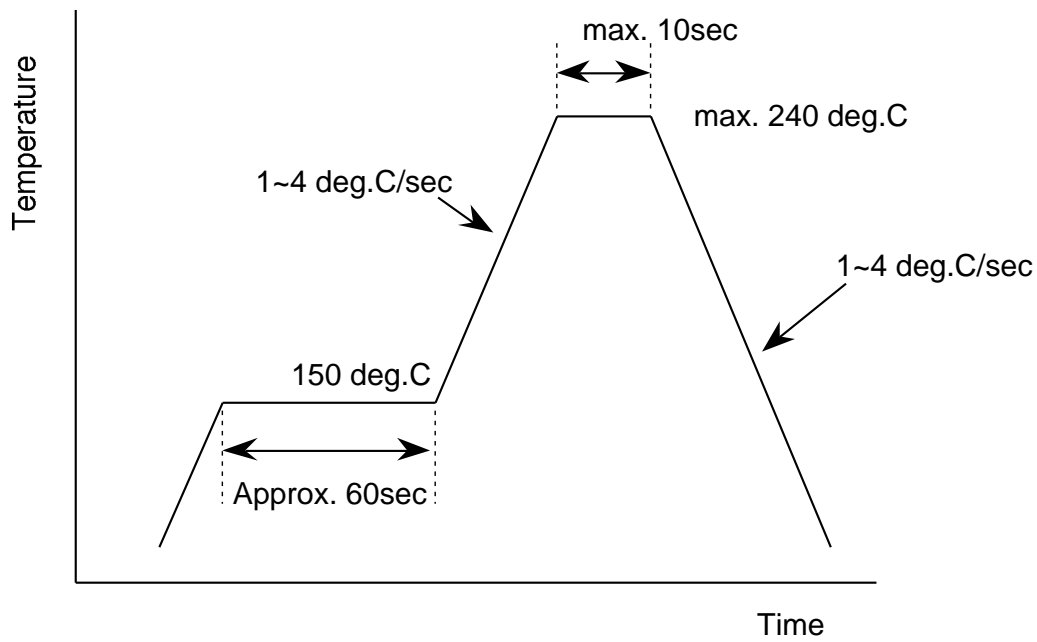
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Recommended Temperature Profile

1) Infrared Reflow and Air Reflow Temperature Profile



- Notes 1) Temperature profile on package surface
2) Reflow process : Up to three times