## Dual N-Channel MOSFET Tetrode
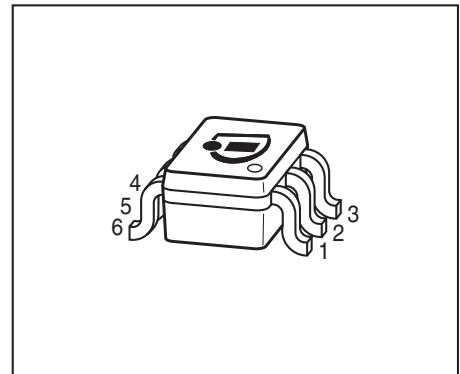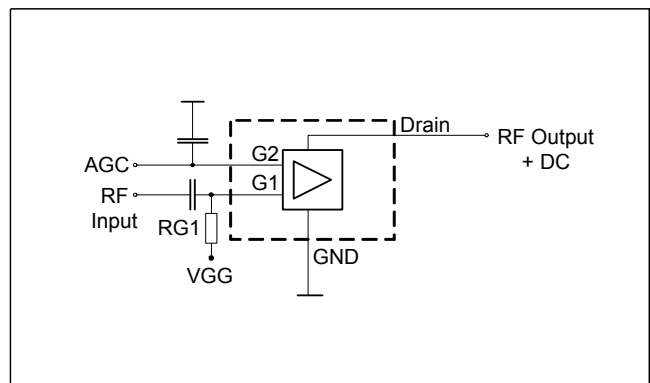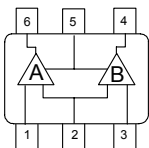
- Low noise gain controlled input stages for UHF and VHF -tuners e. g. (NTSC, PAL)
- Two AGC amplifiers in one single package
- Integrated gate protection diodes
- Low noise figure, high AGC-range
- Improved cross modulation at gain reduction
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101

**BG5120K**

**ESD** (**E**lectro**s**tatic **d**ischarge) sensitive device, observe handling precaution!

| Type | Package | Pin Configuration | | | | | | Marking |
|------|---------|------|------|------|------|------|------|---------|
| BG5120K | SOT363 | 1=G1* | 2=G2 | 3=G1** | 4=D** | 5=S | 6=D* | K1 |

* For amp. A; ** for amp. B
180° rotated tape loading orientation available

## Maximum Ratings

| Parameter | Symbol | Value | Unit |
|-----------|--------|-------|------|
| Drain-source voltage | $V_{DS}$ | 8 | V |
| Continuous drain current | $I_D$ | 20 | mA |
| Gate 1/ gate 2-source current | $\pm I_{G1/2SM}$ | 1 | |
| Gate 1/ gate 2-source voltage | $\pm V_{G1/G2S}$ | 6 | V |
| Total power dissipation | $P_{tot}$ | 200 | mW |
| Storage temperature | $T_{stg}$ | -55 ... 150 | °C |
| Channel temperature | $T_{ch}$ | 150 | |

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## Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Channel - soldering point[1] | $R_{thchs}$ | $\leq 280$ | K/W |

[1]For calculation of $R_{thJA}$ please refer to Application Note Thermal Resistance

## Electrical Characteristics at $T_A$ = 25°C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **DC Characteristics** | | | | | |
| Drain-source breakdown voltage $I_D$ = 10 µA, $V_{G1S}$ = 0 , $V_{G2S}$ = 0 | $V_{(BR)DS}$ | 12 | - | - | V |
| Gate1-source breakdown voltage $+I_{G1S}$ = 10 mA, $V_{G2S}$ = 0 , $V_{DS}$ = 0 | $+V_{(BR)G1SS}$ | 6 | - | 15 | |
| Gate2-source breakdown voltage $+I_{G2S}$ = 10 mA, $V_{G1S}$ = 0 , $V_{DS}$ = 0 | $+V_{(BR)G2SS}$ | 6 | - | 15 | |
| Gate1-source leakage current $V_{G1S}$ = 6 V, $V_{G2S}$ = 0 , $V_{DS}$ = 0 | $+I_{G1SS}$ | - | - | 50 | µA |
| Gate2-source leakage current $V_{G2S}$ = 6 V, $V_{G1S}$ = 0 , $V_{DS}$ = 0 | $+I_{G2SS}$ | - | - | 50 | nA |
| Drain current $V_{DS}$ = 5 V, $V_{G1S}$ = 0 , $V_{G2S}$ = 4 V | $I_{DSS}$ | - | - | 10 | µA |
| Drain-source current $V_{DS}$ = 5 V, $V_{G2S}$ = 4 V, $R_{G1}$ = 100 kΩ | $I_{DSX}$ | - | 12 | - | mA |
| Gate1-source pinch-off voltage $V_{DS}$ = 5 V, $V_{G2S}$ = 4 V, $I_D$ = 20 µA | $V_{G1S(p)}$ | - | 0.7 | - | V |
| Gate2-source pinch-off voltage $V_{DS}$ = 5 V, $I_D$ = 20 µA, $V_{G1S}$ = 2 V | $V_{G2S(p)}$ | - | 0.6 | - | |

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**Electrical Characteristics** at $T_A$ = 25°C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **AC Characteristics** $V_{DS}$= 5V , $V_{G2S}$=4V, ($I_D$=10mA) (verified by random sampling) | | | | | |
| Forward transconductance | $g_{fs}$ | - | 30 | - | mS |
| Gate1 input capacitance $f$ = 10 MHz | $C_{g1ss}$ | - | 2.2 | - | pF |
| Output capacitance $f$ = 10 MHz | $C_{dss}$ | - | 1.4 | - | |
| Power gain 800 MHz 45 MHz | $G_p$ | - - | 23 30 | - - | dB |
| Noise figure 800 MHz 45 MHz , 45 MHz | $F$ | - - | 1.1 0.7 | - - | dB |
| Gain control range $V_{G2S}$ = 4 ... 0 V, $f$ = 800 MHz | $\Delta G_p$ | 45 | - | - | |
| Cross-modulation $k$=1%, $f_W$=50MHz, $f_{unw}$=60MHz $AGC$ = 0 dB $AGC$ = 10 dB $AGC$ = 40 dB | $X_{mod}$ | 90 - 96 | - 87 100 | - - - | dBµV |

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**Total power dissipation** $P_{tot} = f(T_S)$
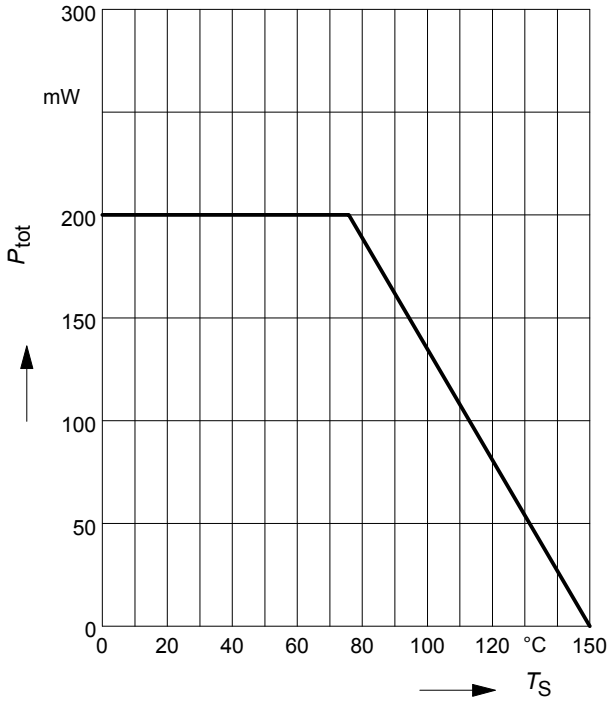


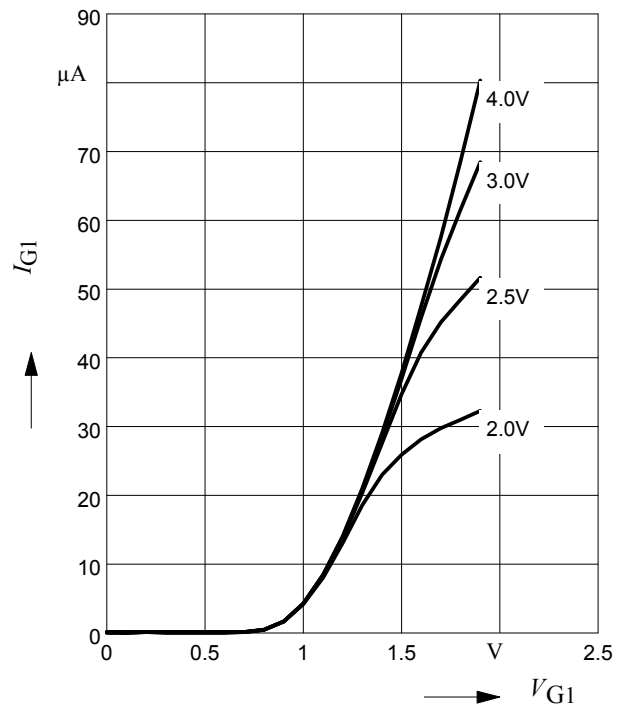**Drain current** $I_D = f(I_{G1})$

$V_{G2S} = 4V$
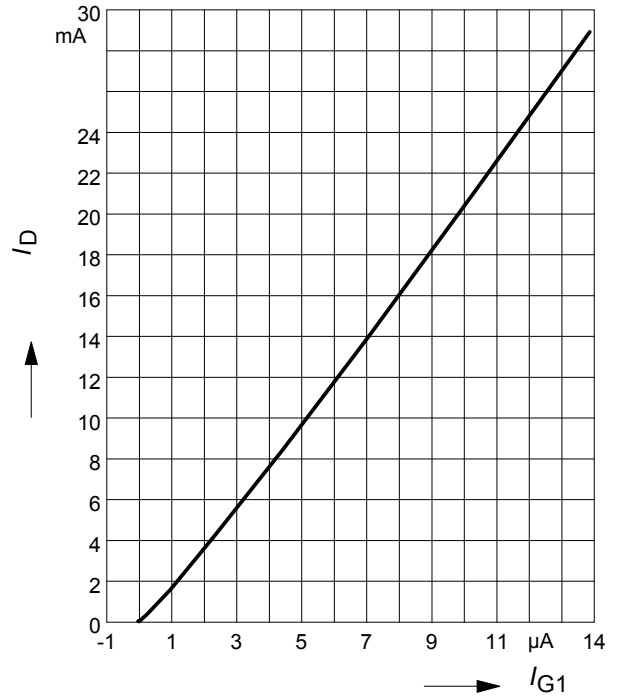


**Output characteristics** $I_D = f(V_{DS})$
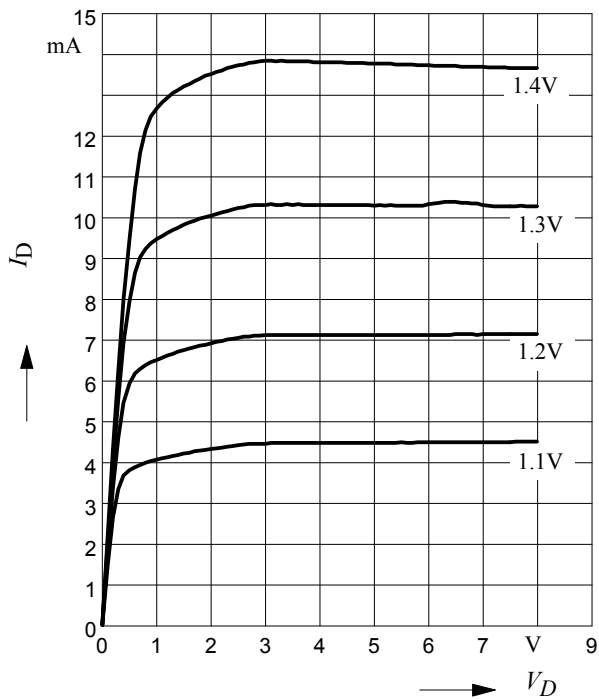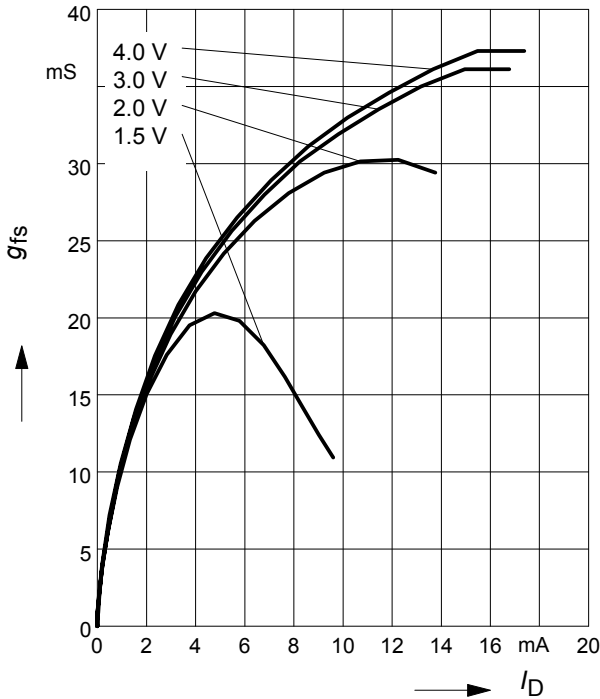


**Gate 1 current** $I_{G1} = f(V_{G1S})$

$V_{DS} = 5V$
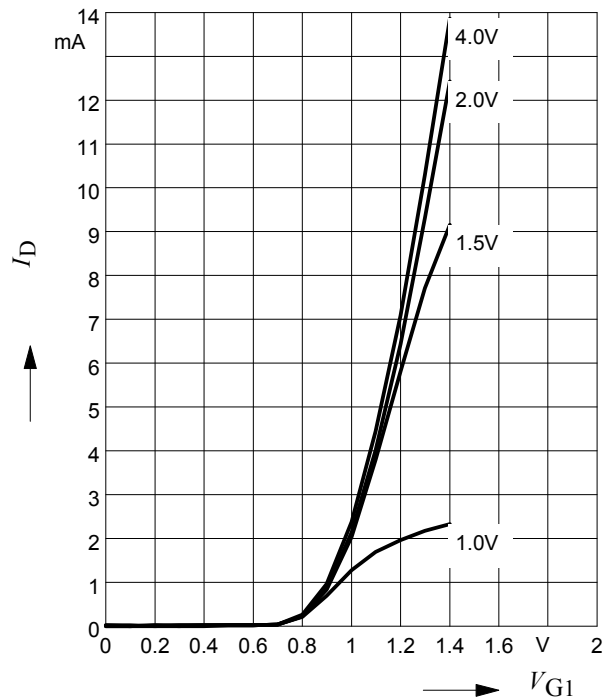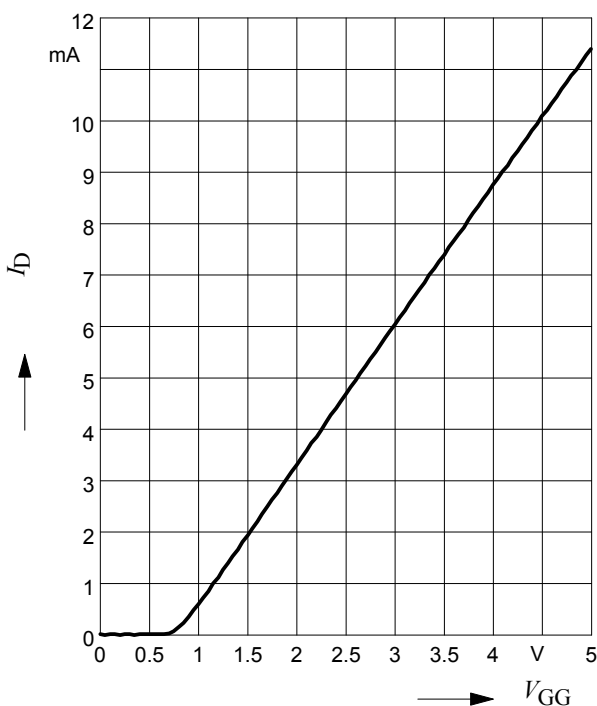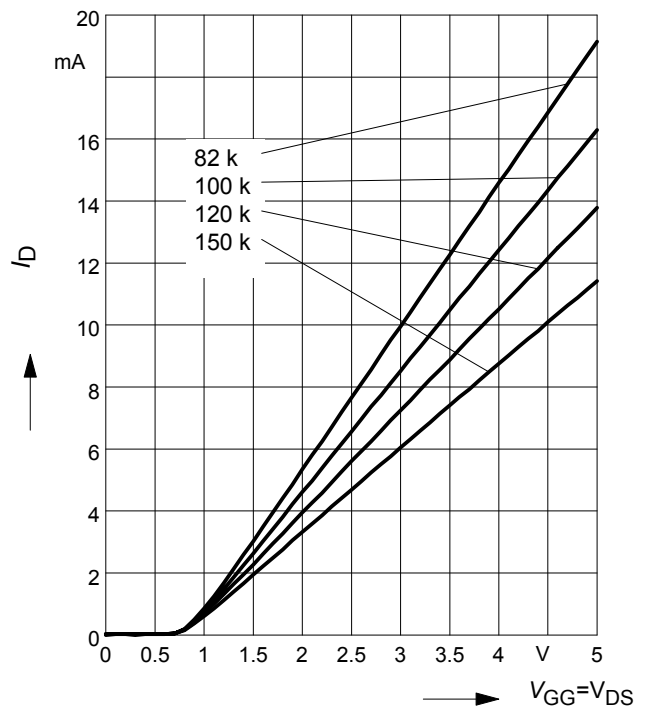
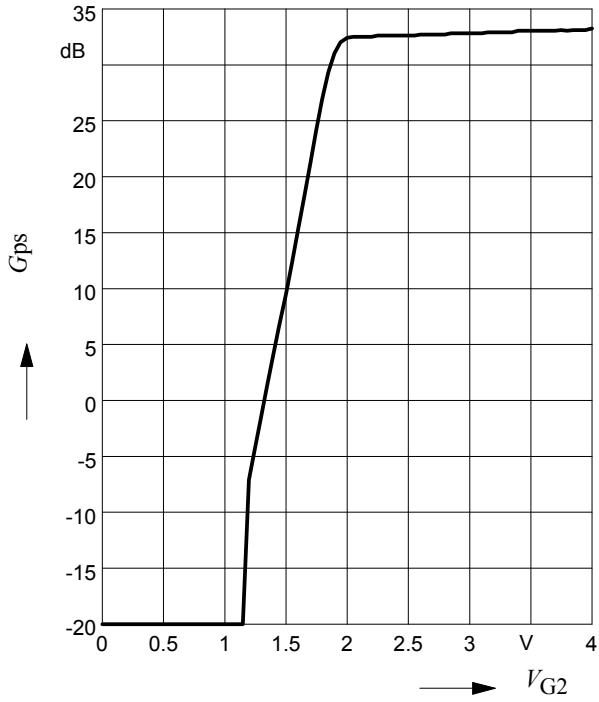$V_{G2S}$ = Parameter



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**Gate 1 forward transconductance**

$g_{fs} = f(I_D)$

$V_{DS}$ = 5V, $V_{G2S}$ = Parameter



**Drain current** $I_D = f(V_{G1S})$

$V_{DS}$ = 5V

$V_{G2S}$ = Parameter



**Drain current** $I_D = f(V_{GG})$

$V_{DS}$ = 5V, $V_{G2S}$ = 4V, $R_{G1}$ = 150kΩ

(connected to $V_{GG}$, $V_{GG}$=gate1 supply voltage)



**Drain current** $I_D = f(V_{GG})$

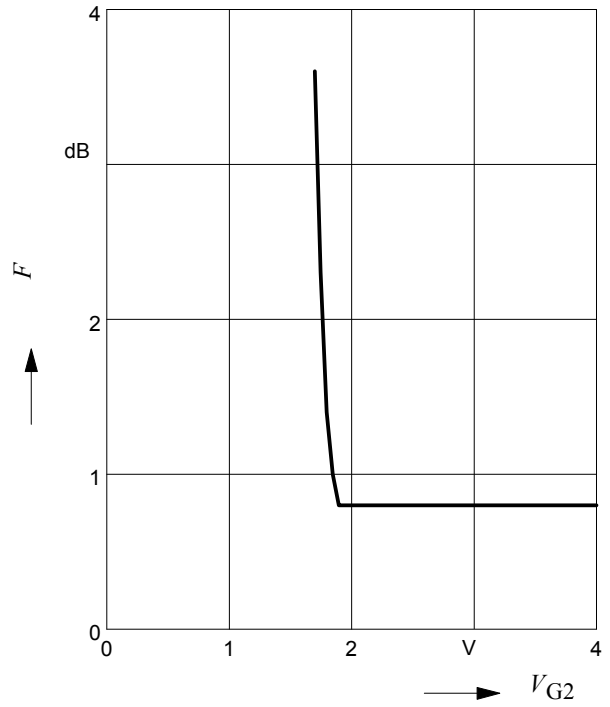$V_{DS}$ = 5V, $V_{G2S}$ = 4V

$R_{G1}$ = Parameter in kΩ

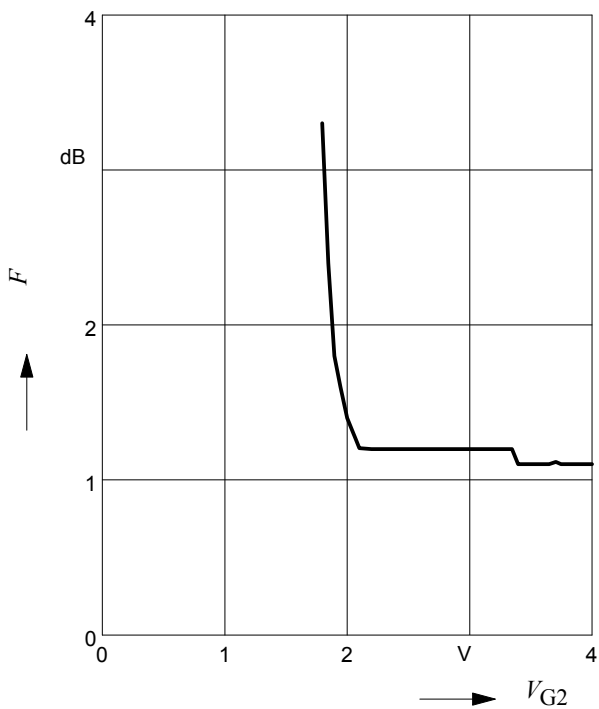2009-10-01

**Power gain** $G_{ps} = f(V_{G2S})$

$f$= 45MHz



**Noise figure** $F = f(V_{G2S})$

$f$=45MHz



**Noise figure** $F = f(V_{G2S})$
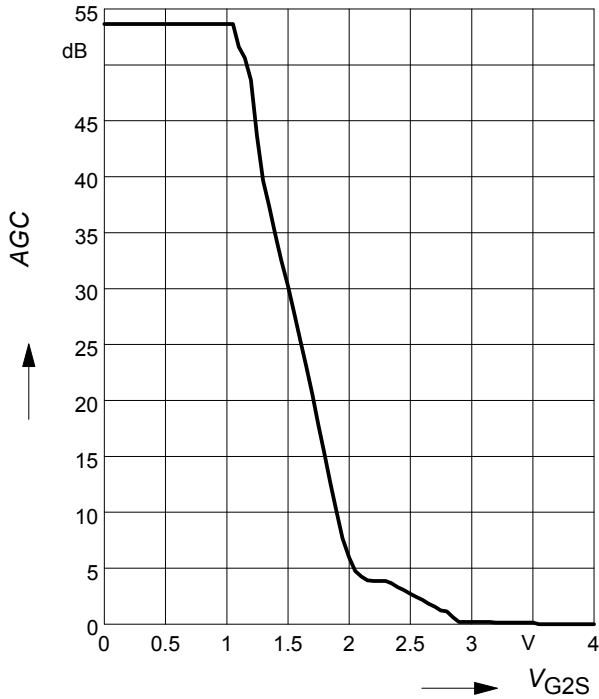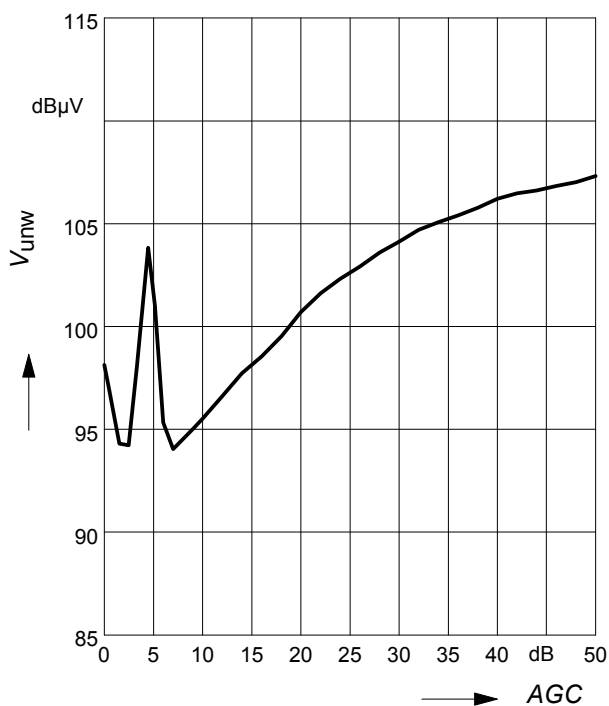
$f$=800MHz
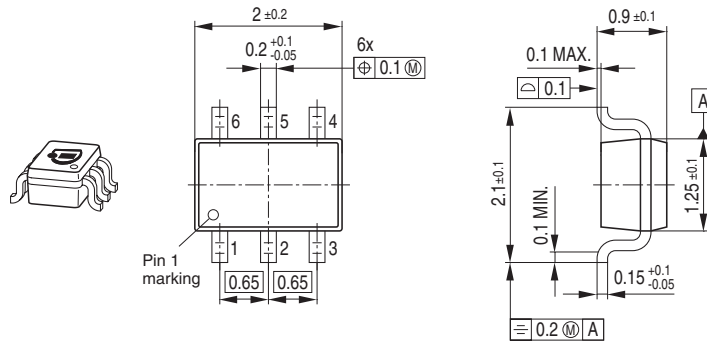


**Power gain** $G_{ps} = f(V_{G2S})$

$f$ = 800 GHz

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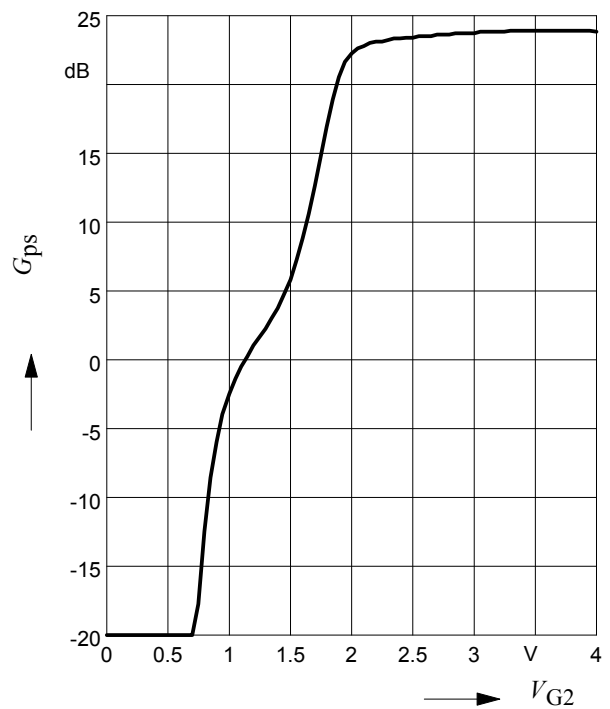
**AGC characteristic** $AGC = f(V_{G2S})$

$V_{DS}$ = 5 V, $R_{GG}$ = 120 kΩ, $f$ = 45 MHz



**AGC characteristic** $AGC = f(V_{G2S})$

$V_{DS}$ = 5 V, $R_{GG}$ = 120 kΩ, $f$ = 800 MHz
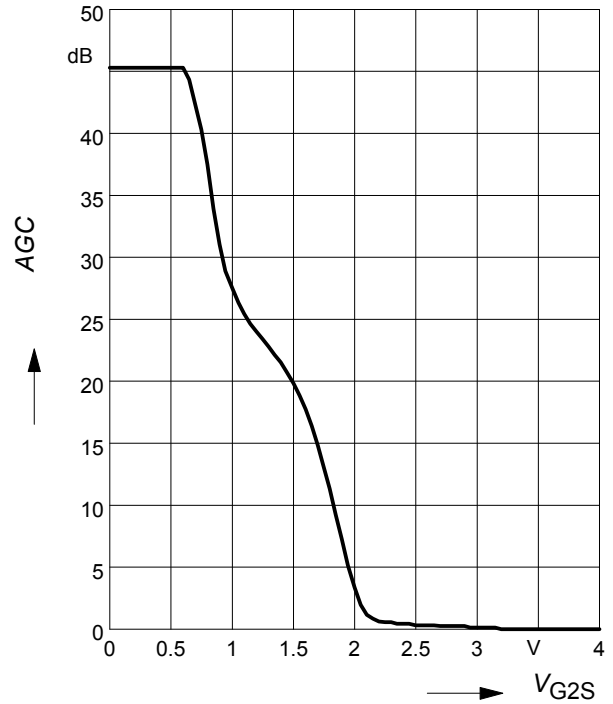


**Crossmodulation** $V_{unw} = (AGC)$

$V_{DS}$ = 5 V, $I_D$ = 14 mA

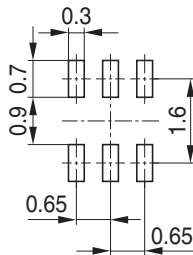2009-10-01

## Crossmodulation test circuit



Semibiased
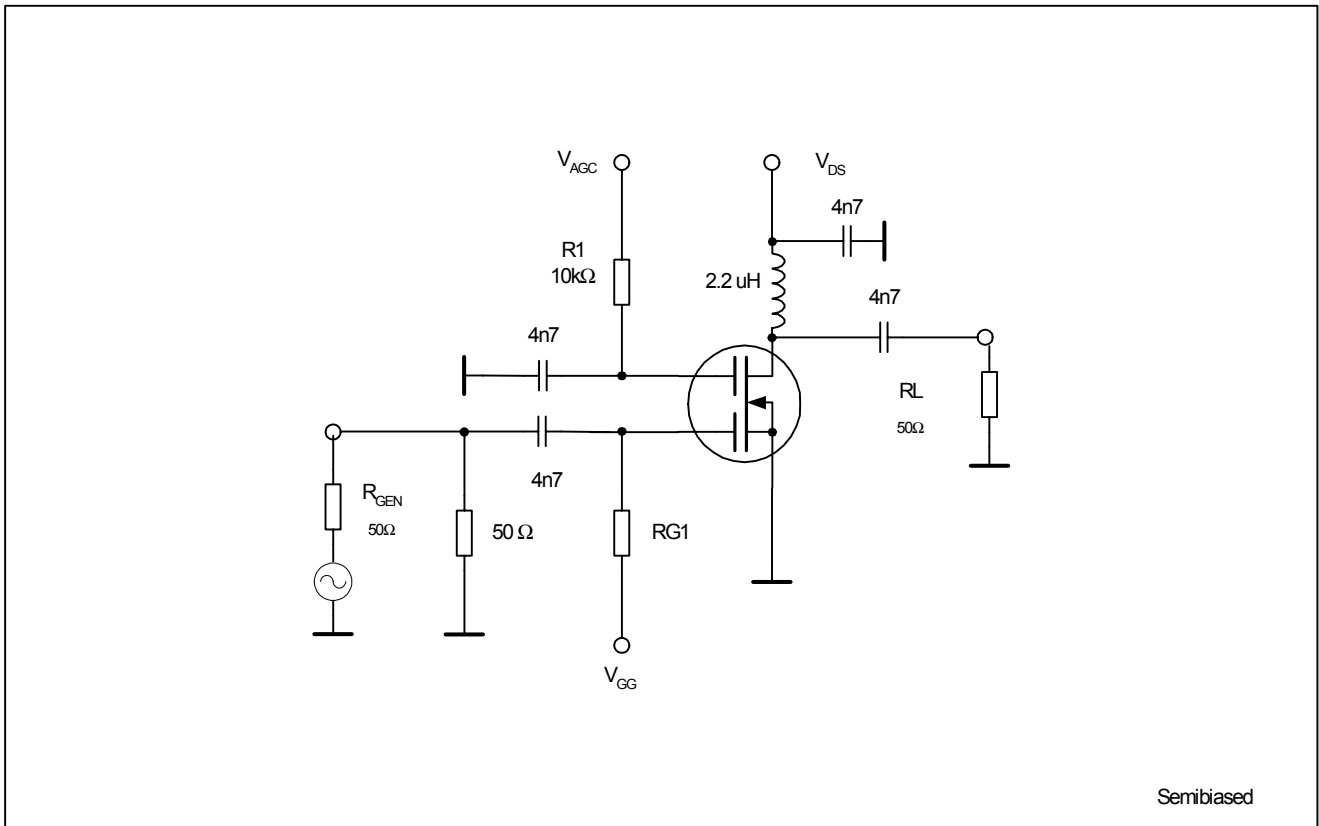
## Package Outline



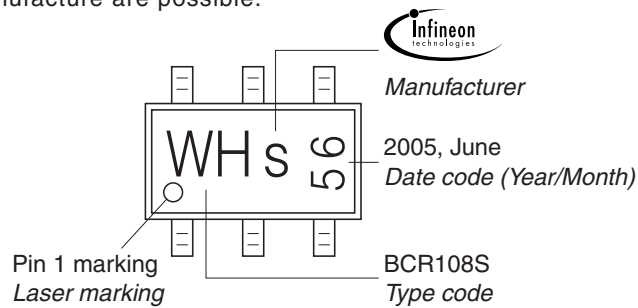## Foot Print



## Marking Layout (Example)

Small variations in positioning of
Date code, Type code and Manufacture are possible.



*Manufacturer*

2005, June
*Date code (Year/Month)*

Pin 1 marking
*Laser marking*

BCR108S
*Type code*

## Standard Packing

Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel

For symmetric types no defined Pin 1 orientation in reel.
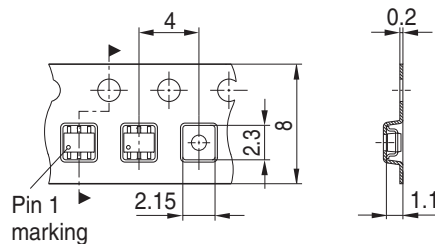


Pin 1
marking

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