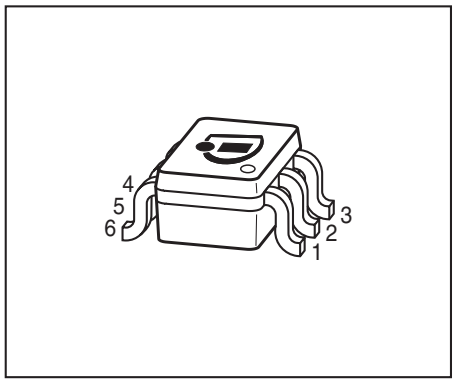
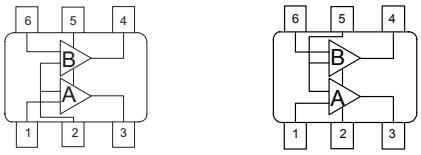
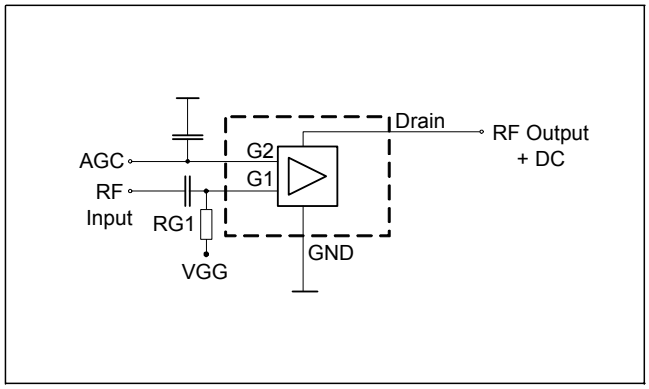
## DUAL N-Channel MOSFET Tetrode




- Two gain controlled input stages for UHF and VHF -tuners e.g. (NTSC, PAL)
- Optimized for UHF (amp. B) and VHF (amp. A)
- Integrated gate protection diodes
- High AGC-range, low noise figure, high gain
- Improved cross modulation at gain reduction

**BG3123** **BG3123R**




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

| Type | Package | Pin Configuration | | | | | | Marking |
|---|---|---|---|---|---|---|---|---|
| BG3123 | SOT363 | 1=G1* | 2=G2 | 3=D* | 4=D** | 5=S | 6=G1** | KOs |
| BG3123R | SOT363 | 1=G1* | 2=S | 3=D* | 4=D** | 5=G2 | 6=G1** | KRs |

* 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 | $I_D$ | | mA |
| amp. A | | 25 | |
| amp. B | | 20 | |
| 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 | |

## Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Channel - soldering point[1)] | $R_{thchs}$ | ≤ 150 | K/W |

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

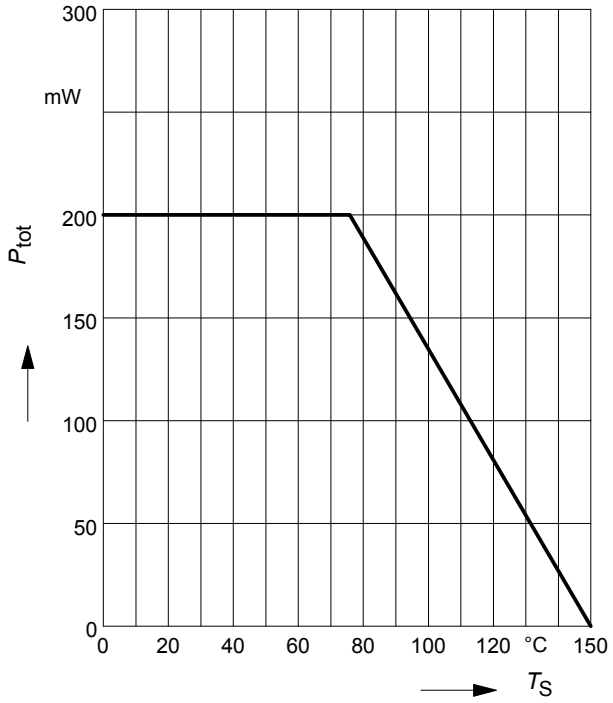
| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **DC Characteristics** | | | | | |
| Drain-source breakdown voltage<br>$I_D$ = 10 µA, $V_{G1S}$ = 0 V, $V_{G2S}$ = 0 V | $V_{(BR)DS}$ | 12 | - | - | V |
| Gate1-source breakdown voltage<br>+$I_{G1S}$ = 10 mA, $V_{G2S}$ = 0 V, $V_{DS}$ = 0 V | +$V_{(BR)G1SS}$ | 6 | - | 15 | |
| Gate2-source breakdown voltage<br>+$I_{G2S}$ = 10 mA, $V_{G1S}$ = 0 V, $V_{DS}$ = 0 V | +$V_{(BR)G2SS}$ | 6 | - | 15 | |
| Gate1-source leakage current<br>$V_{G1S}$ = 6 V, $V_{G2S}$ = 0 V | +$I_{G1SS}$ | - | - | 50 | µA |
| Gate2-source leakage current<br>$V_{G2S}$ = 8 V, $V_{G1S}$ = 0 V, $V_{DS}$ = 0 V | +$I_{G2SS}$ | - | - | 50 | nA |
| Drain current<br>$V_{DS}$ = 5 V, $V_{G1S}$ = 0 V, $V_{G2S}$ = 4.5 V | $I_{DSS}$ | - | - | 10 | µA |
| Drain-source current<br>$V_{DS}$ = 5 V, $V_{G2S}$ = 4 V, $R_{G1}$ = 60 kΩ,<br>amp. A<br>$V_{DS}$ = 5 V, $V_{G2S}$ = 4 V, $R_{G1}$ = 50 kΩ,<br>amp. B | $I_{DSX}$ | <br><br>-<br><br>- | <br><br>14<br><br>14 | <br><br>-<br><br>- | mA |
| Gate1-source pinch-off voltage<br>$V_{DS}$ = 5 V, $V_{G2S}$ = 4 V, $I_D$ = 20 µA | $V_{G1S(p)}$ | - | 0.7 | - | V |
| Gate2-source pinch-off voltage<br>$V_{DS}$ = 5 V, $I_D$ = 20 µA | $V_{G2S(p)}$ | - | 0.6 | - | |

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

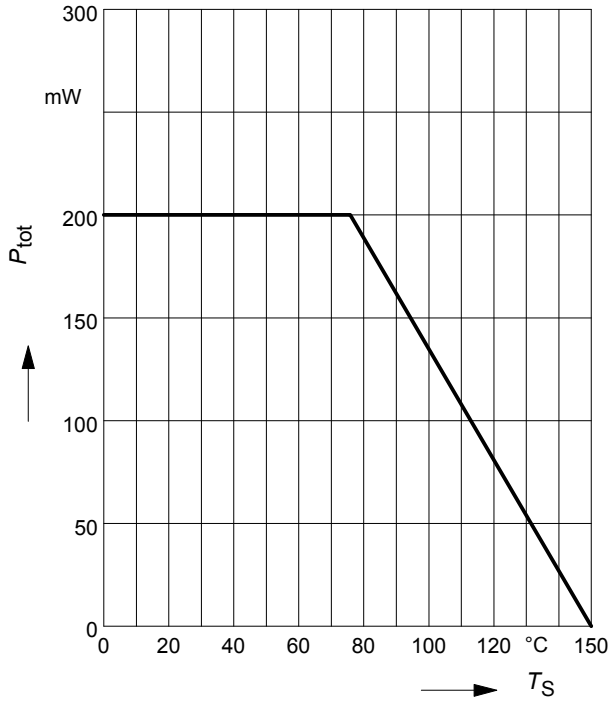
**Electrical Characteristics** at $T_A$ = 25°C, unless otherwise specified

| Parameter | Symbol | Values | | | Unit |
|---|---|---|---|---|---|
| | | min. | typ. | max. | |
| **AC Characteristics** $V_{DS}$ = 5V, $V_{G2S}$ = 4V, ($I_D$ = 14 mA) (verified by random sampling) | | | | | |
| Forward transconductance | $g_{fs}$ | | | | mS |
| amp. A | | - | 30 | - | |
| amp. B | | - | 25 | - | |
| Gate1 input capacitance | $C_{g1ss}$ | | | | pF |
| $f$ = 10 MHz, amp. A | | - | 1.9 | - | |
| $f$ = 10 MHz, amp. B | | - | 1.5 | - | |
| Output capacitance | $C_{dss}$ | | | | |
| $f$ = 10 MHz, amp. A | | - | 1.3 | - | |
| $f$ = 10 MHz, amp. B | | - | 1.1 | - | |
| Power gain | $G_p$ | | | | dB |
| $f$ = 800 MHz, amp. A | | - | 25 | - | |
| $f$ = 800 MHz, amp. B | | - | 24 | - | |
| $f$ = 45 MHz, amp. A | | - | 32 | - | |
| $f$ = 45 MHz, amp. B | | - | 30 | - | |
| Noise figure | $F$ | | | | dB |
| $f$ = 800 MHz, amp. A | | - | 1.8 | - | |
| $f$ = 800 MHz, amp. B | | - | 1.8 | - | |
| $f$ = 45 MHz, amp. A | | - | 1.4 | - | |
| $f$ = 45 MHz, amp. B | | - | 1.6 | - | |
| Gain control range | $\Delta G_p$ | 45 | - | - | |
| $V_{G2S}$ = 4 ... 0 V , $f$ = 800 MHz | | | | | |
| Cross-modulation $k$=1%, $f_w$=50MHz, $f_{unw}$=60MHz | $X_{mod}$ | | | | - |
| amp.A , $AGC$ = 0 dB | | 90 | 96 | - | |
| amp. B, $AGC$ = 0 dB | | 90 | 97 | - | |
| amp. A , $AGC$ = 10 dB | | - | 91 | - | |
| amp. B , $AGC$ = 10 dB | | - | 94 | - | |
| amp. A, $AGC$ = 40 dB | | 98 | 103 | - | |
| amp. B, $AGC$ = 40 dB | | 98 | 104 | - | |

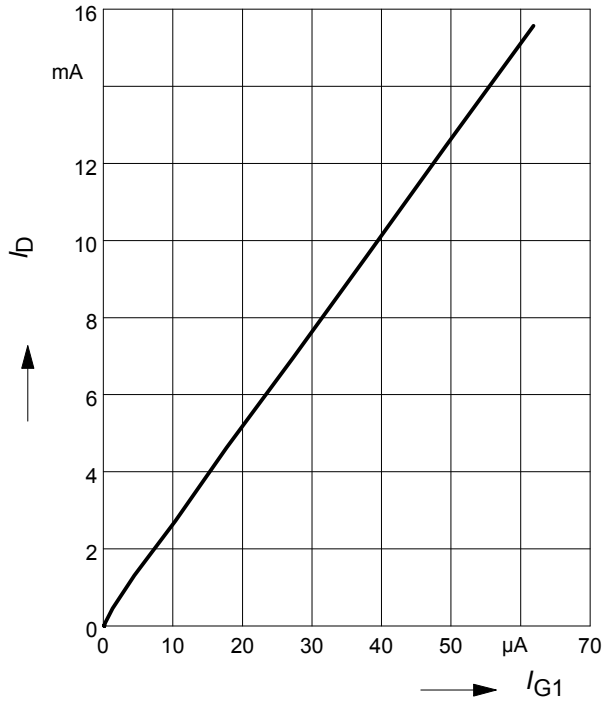
**Total power dissipation $P_{tot} = f(T_S)$**
amp. A



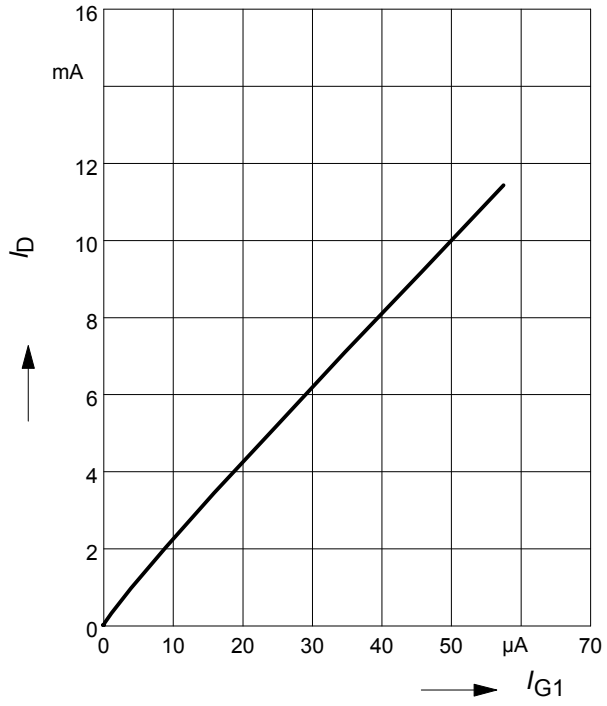

**Total power dissipation $P_{tot} = f(T_S)$**
amp. B



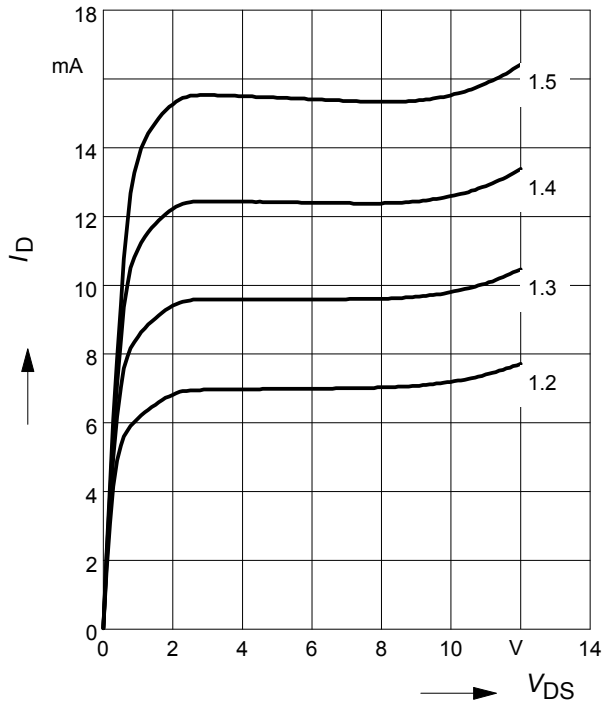

**Drain current $I_D = f(I_{G1})$**
$V_{G2S}$ = 4V
amp. A



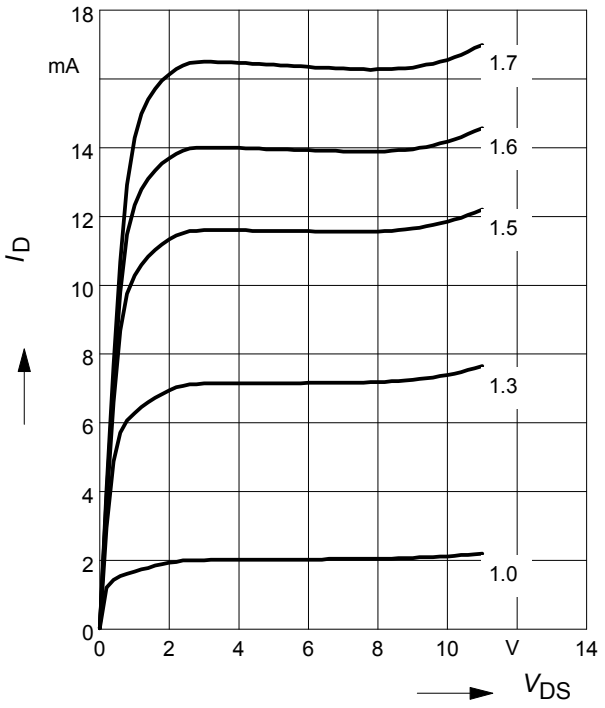

**Drain current $I_D = f(I_{G1})$**
$V_{G2S}$ = 4V
amp. B



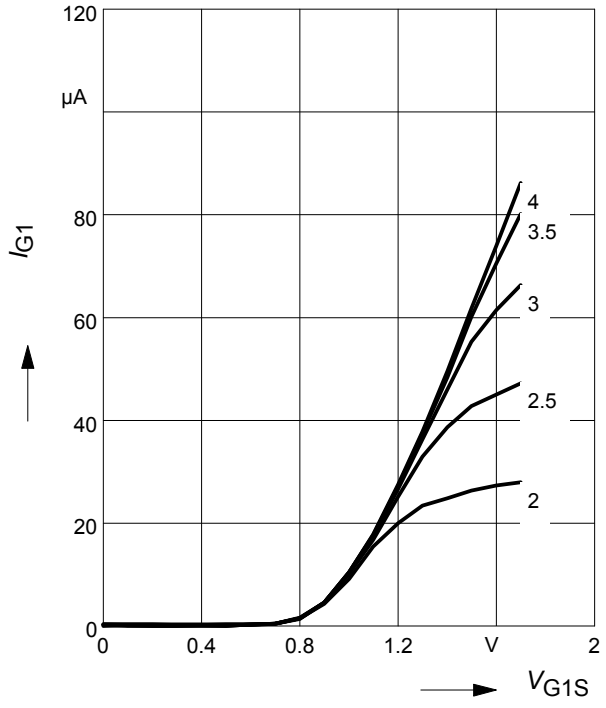
**Output characteristics** $I_D = f(V_{DS})$
$V_{G2S}$ = 4V, $V_{G1S}$ = Parameter in V
amp. A



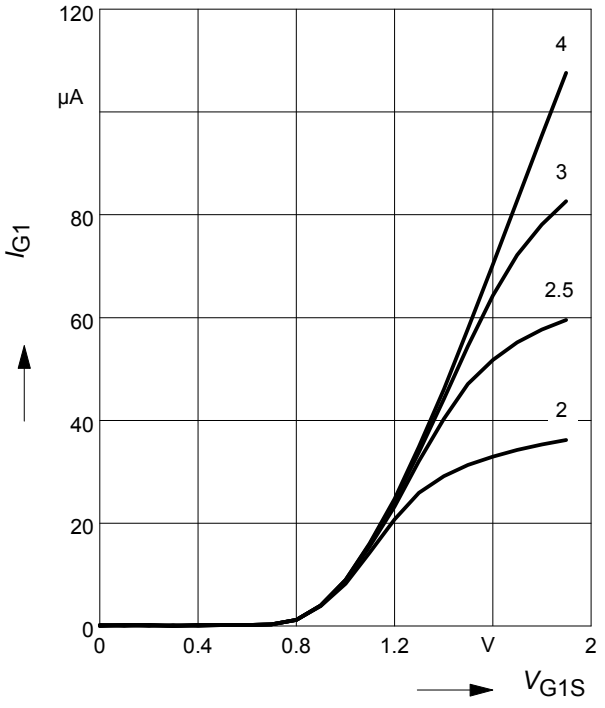

**Output characteristics** $I_D = f(V_{DS})$
$V_{G2S}$ = 4V, $V_{G1S}$ = Parameter in V
amp. B




**Gate 1 current** $I_{G1} = f(V_{G1S})$
$V_{DS}$ = 5V, $V_{G2S}$ = Parameter in V
amp. A



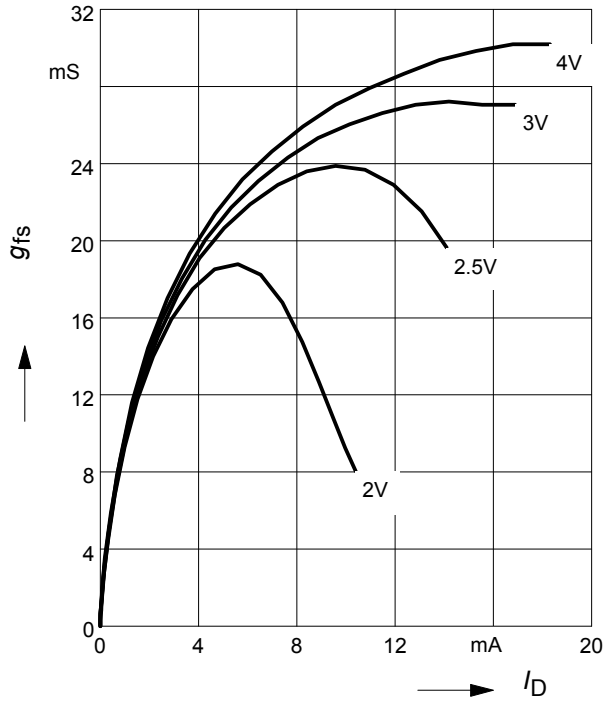

**Gate 1 current** $I_{G1} = f(V_{G1S})$
$V_{DS}$ = 5V, $V_{G2S}$ = Parameter in V
amp. B



**Gate 1 forward transconductance**

$g_{fs} = f(I_D)$, $V_{DS}$ = 5V, $V_{G2S}$ = Parameter

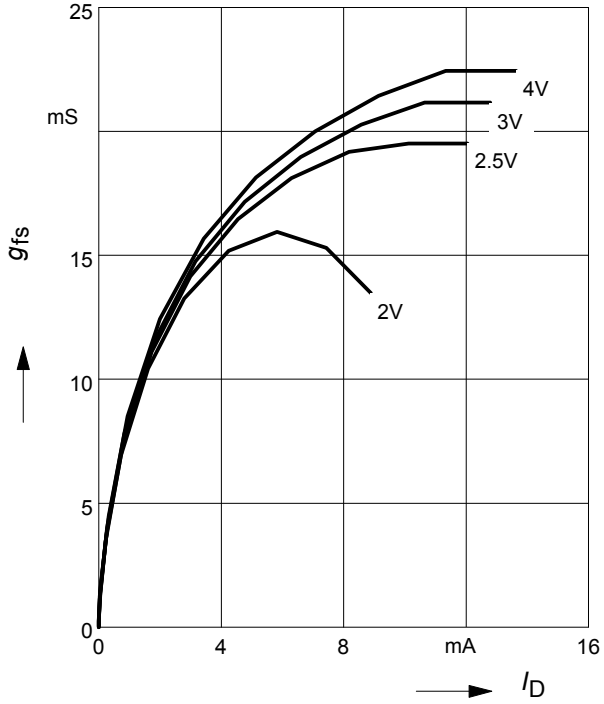
amp. A




**Gate 1 forward transconductance**

$g_{fs} = f(I_D)$, $V_{DS}$ = 5V, $V_{G2S}$ = Parameter

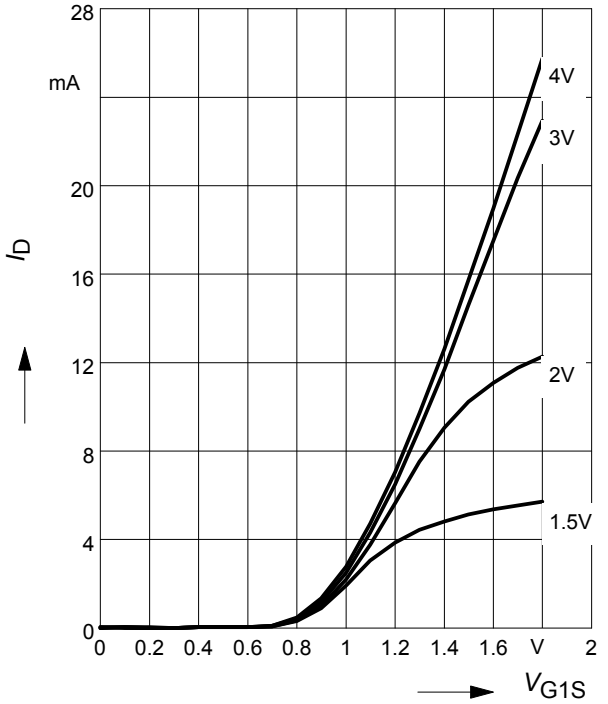
amp. B




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

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

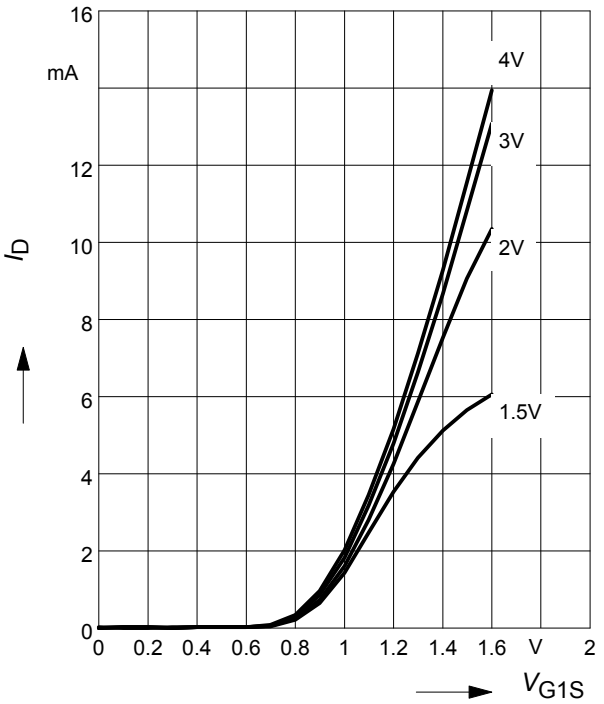
amp. A




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

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

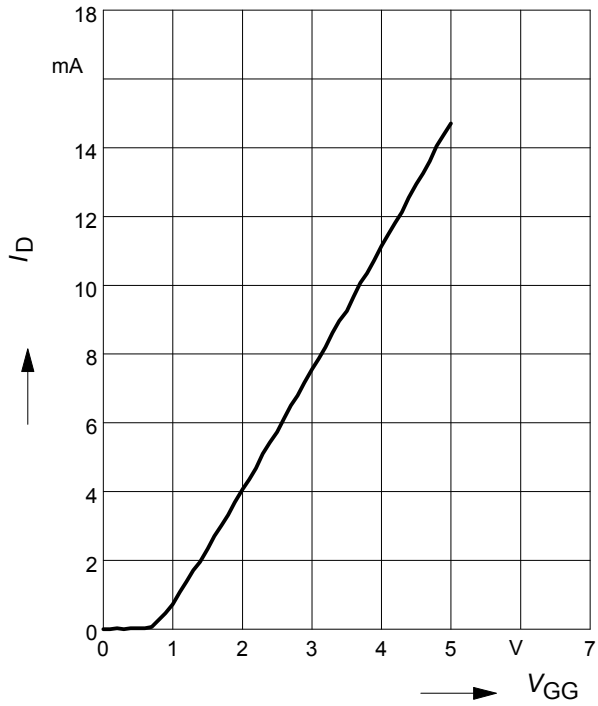
amp. B



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

$V_{DS}$ = 5V, $V_{G2S}$ = 4V, $R_{G1}$ = 60kΩ

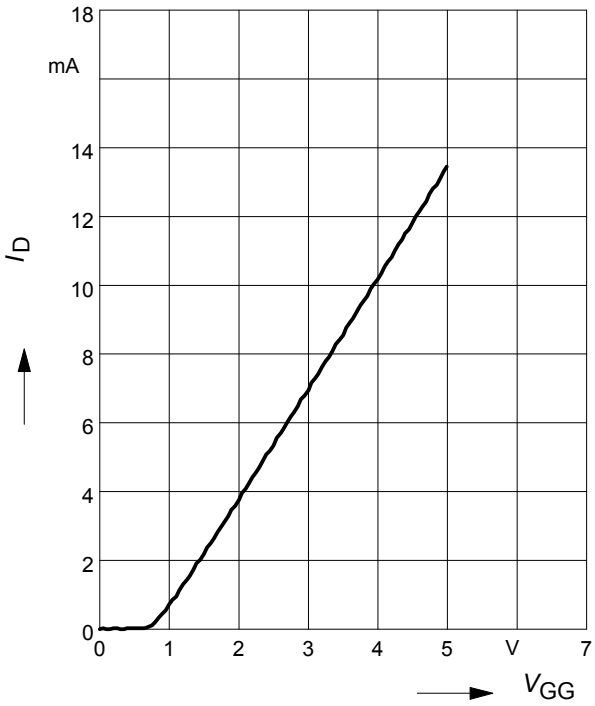
(connected to $V_{GG}$, $V_{GG}$=gate1 supply voltage)




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

$V_{DS}$ = 5V, $V_{G2S}$ = 4V, $R_{G1}$ = 50kΩ

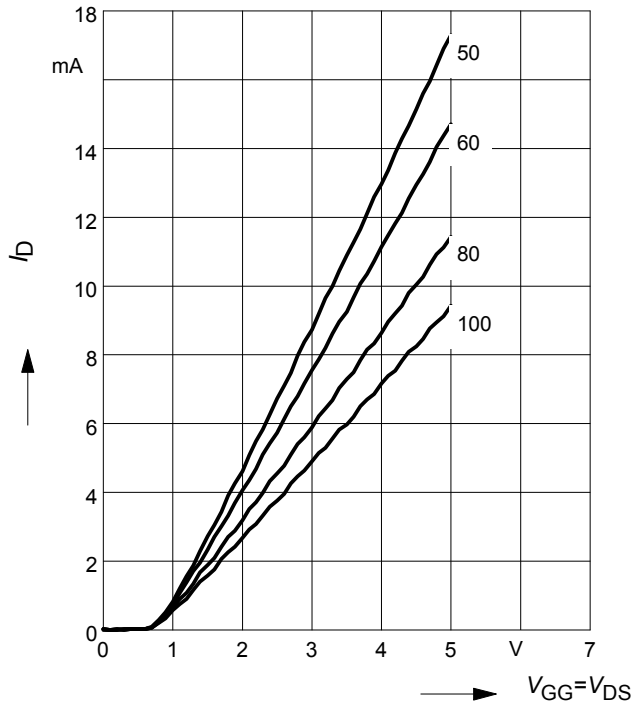
(connected to $V_{GG}$, $V_{GG}$=gate1 supply voltage)




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

$V_{G2S}$ = 4V, $R_{G1}$ = Parameter in kΩ

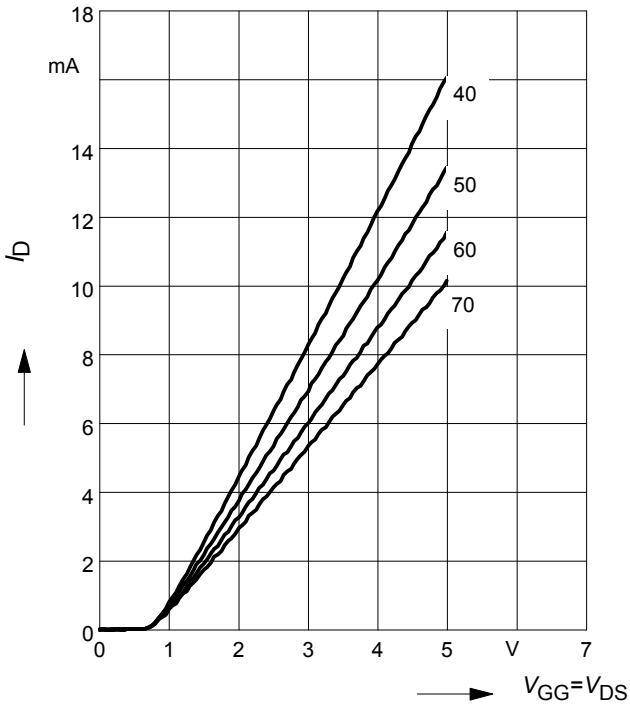
amp. A




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

$V_{G2S}$ = 4V, $R_{G1}$ = Parameter in kΩ

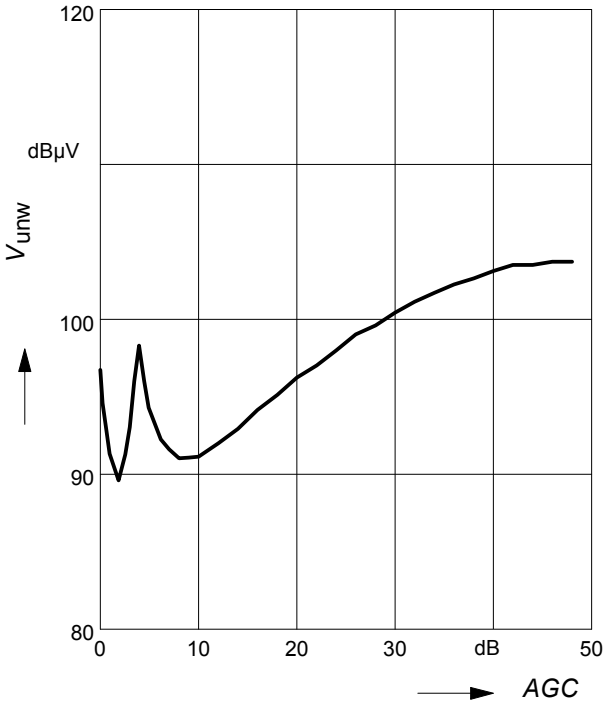
amp. B



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

$V_{DS}$ = 5 V, $R_{g1}$ = 68 kΩ

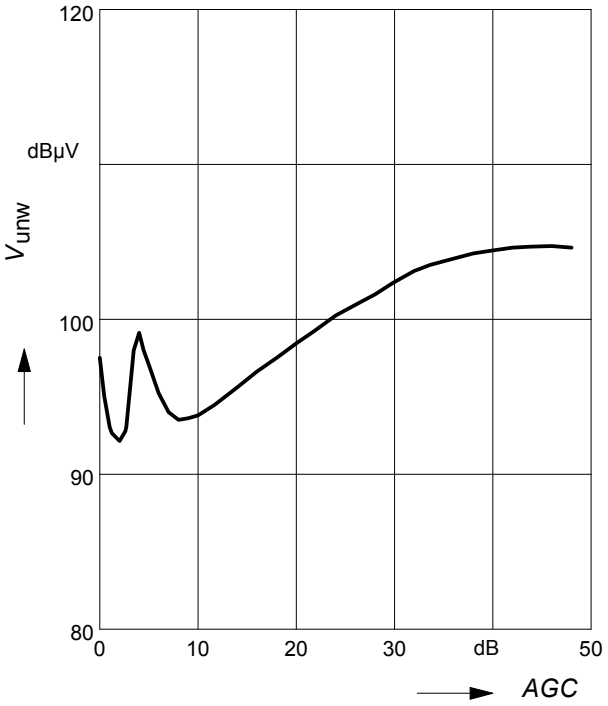
amp.A



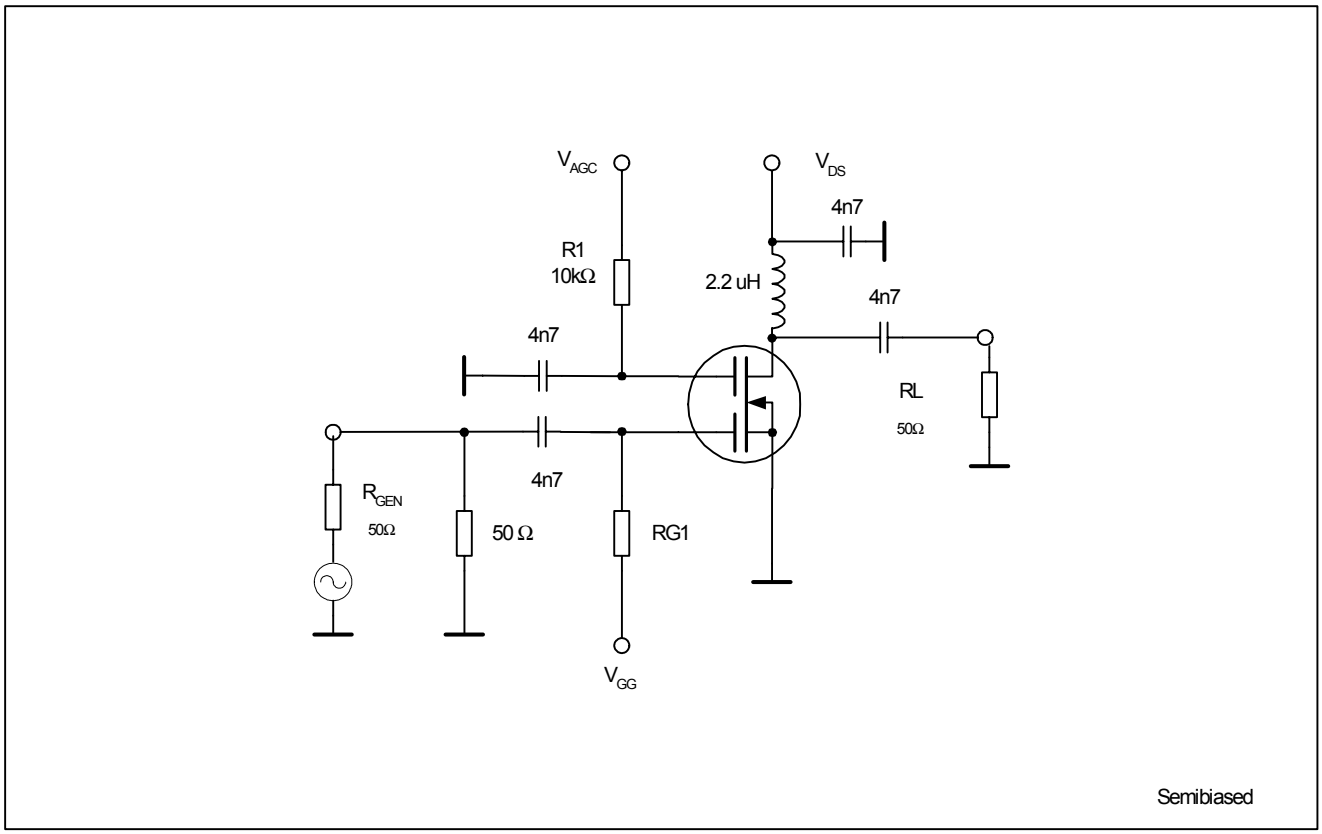

**Crossmodulation** $V_{unw}$ = (*AGC*)

$V_{DS}$ = 5 V, $R_{g1}$ = 56 kΩ

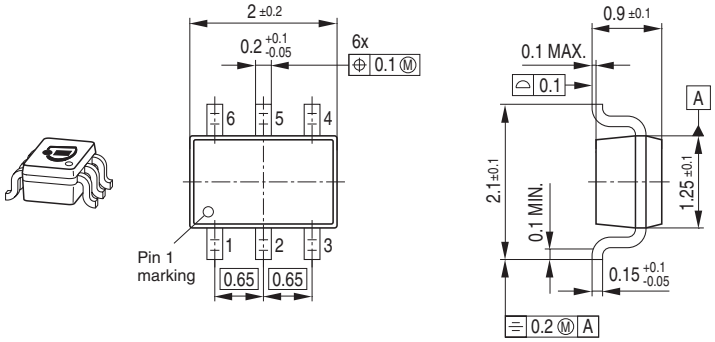
amp.B



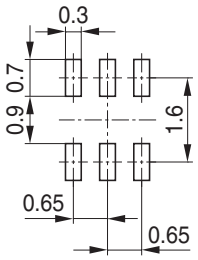
## Crossmodulation test circuit



## Package Outline

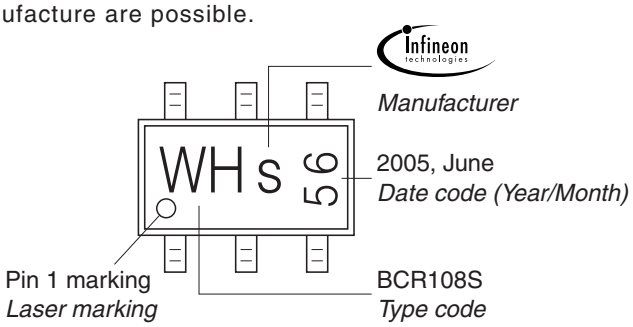



## Foot Print




## Marking Layout (Example)

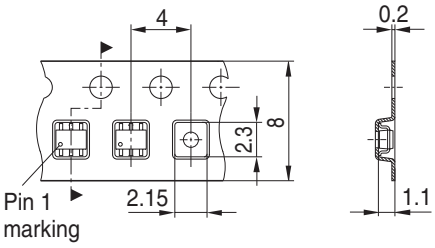
Small variations in positioning of
Date code, Type code and Manufacture are possible.




## 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.



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