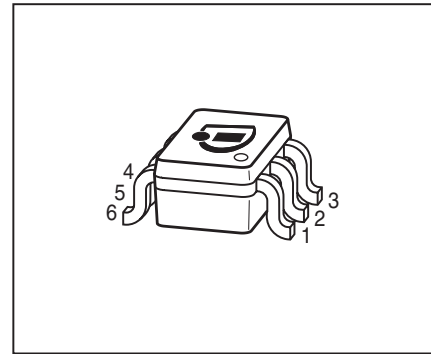
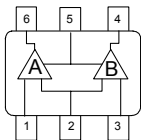


Dual N-Channel MOSFET Tetrode

- Designed for input stages of 2 band tuners
- Two AGC amplifiers in one single package, with on-chip internal switch
- Only one switching line to control both FETs
- Integrated gate protection diodes
- Ultra low noise figure
- Excellent cross modulation at gain reduction
- Integrated ESD gate protection diodes
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



Detailed functional diagram on page 5


BG5412K


ESD (Electrostatic discharge) sensitive device, observe handling precaution!

Type	Package	Pin Configuration						Marking
BG5412K	SOT363	1=G1*	2=G2	3=G1**	4=D**	5=S	6=D*	K2s

* 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 amp. A amp. B	I_D	25 25	mA
Gate 1/ gate 2-source current	I_{G1S}, I_{G2S}	± 1	mA
Gate 1/ gate 2-source voltage	V_{G1S}, V_{G2S}	± 6	V
Total power dissipation $T_S \leq 94 \text{ }^\circ\text{C}$	P_{tot}	200	mW
Storage temperature	T_{stg}	-55 ... 150	$^\circ\text{C}$
Channel temperature	T_{ch}	150	

Thermal Resistance

Parameter	Symbol	Value	Unit
Channel - soldering point ¹⁾	R_{thchs}	≤ 280	K/W

¹⁾For calculation of R_{thJA} please refer to Application Note Thermal Resistance

Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified

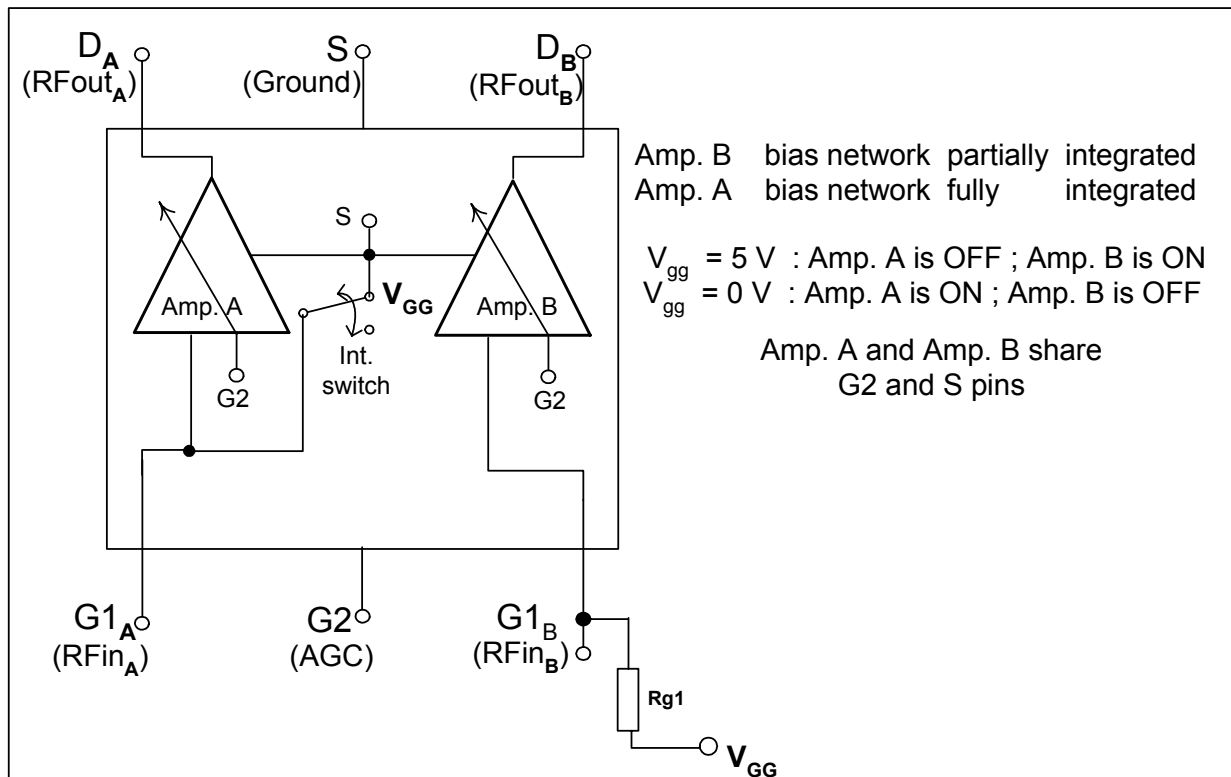
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Drain-source breakdown voltage $I_D = 100 \mu\text{A}$, $V_{G1S} = 0$, $V_{G2S} = 0$	$V_{(BR)DS}$	12	-	-	V
Gate1-source breakdown voltage $+I_{G1S} = 10 \text{ mA}$, $V_{G2S} = 0$, $V_{DS} = 0$	$+V_{(BR)G1SS}$	6	-	15	
Gate2-source breakdown voltage $+I_{G2S} = 10 \text{ mA}$, $V_{G1S} = 0$, $V_{DS} = 0$	$+V_{(BR)G2SS}$	6	-	15	
Gate1-source leakage current $V_{G1S} = 6 \text{ V}$, $V_{G2S} = 0$, $V_{DS} = 0$	$+I_{G1SS}$	-	-	50	nA
Gate2-source leakage current $V_{G2S} = 8 \text{ V}$, $V_{G1S} = 0$	$+I_{G2SS}$	-	-	50	
Drain current $V_{DS} = 5 \text{ V}$, $V_{G1S} = 0$, $V_{G2S} = 4 \text{ V}$	I_{DSS}	-	-	100	μA
Drain-source current $V_{DS} = 5 \text{ V}$, $V_{G2S} = 4 \text{ V}$, $R_{G1} = 120 \text{ k}\Omega$, amp. B $V_{DS} = 5 \text{ V}$, $V_{G2S} = 4 \text{ V}$, selfbiased, amp. A	I_{DSX}	-	14 18	-	mA
Gate1-source pinch-off voltage $V_{DS} = 5 \text{ V}$, $V_{G2S} = 4 \text{ V}$, $I_D = 100 \mu\text{A}$	$V_{G1S(p)}$	-	0.7	-	V
Gate2-source pinch-off voltage $V_{DS} = 5 \text{ V}$, $I_D = 100 \mu\text{A}$	$V_{G2S(p)}$	-	0.7	-	

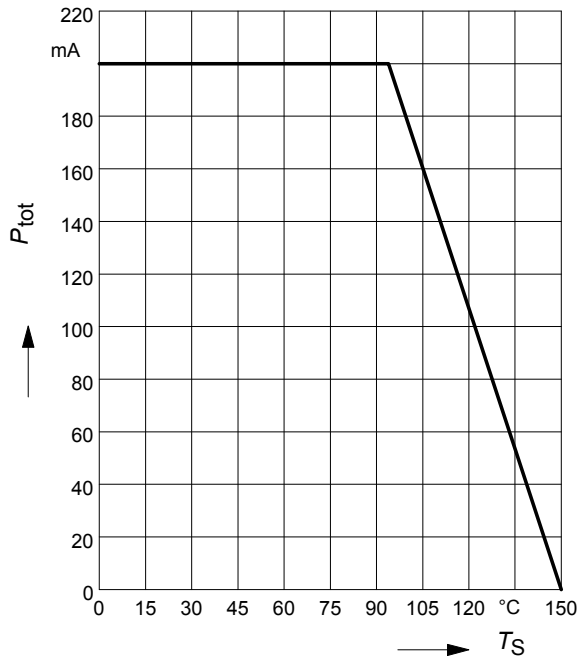
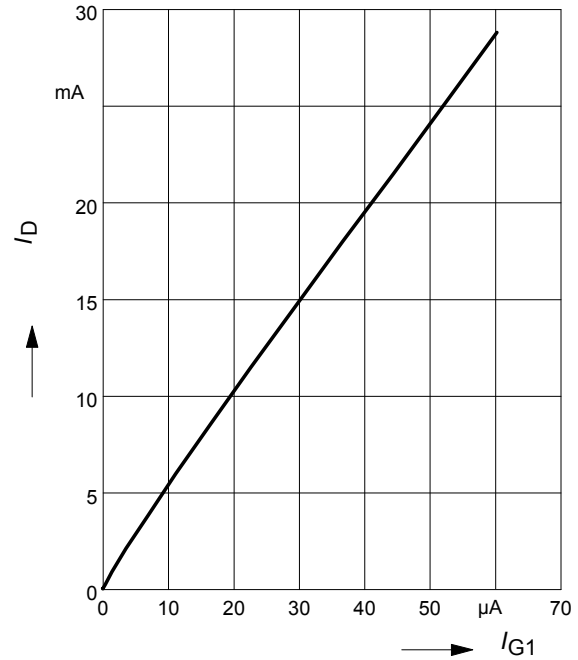
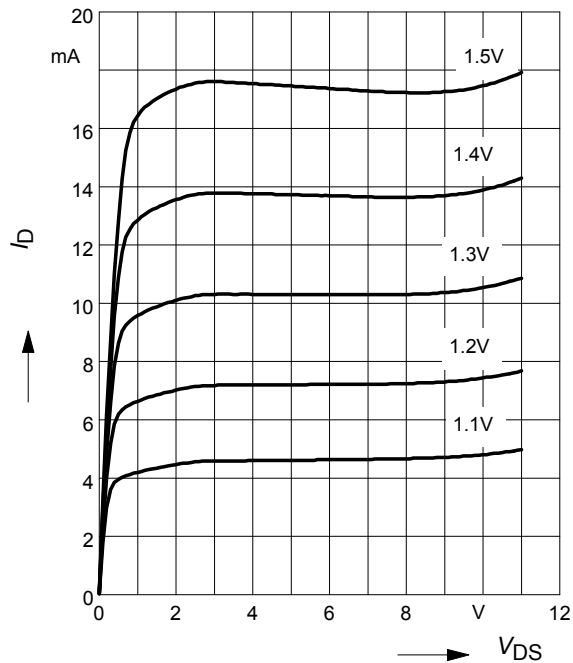
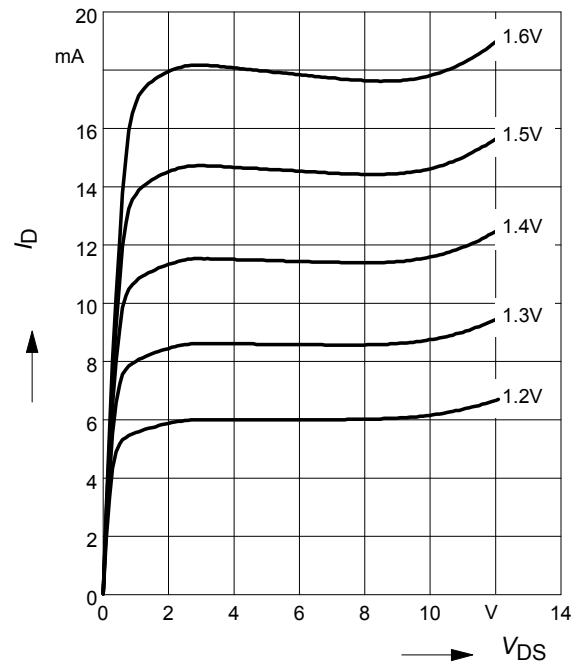
Electrical Characteristics at $T_A = 25^\circ\text{C}$, unless otherwise specified

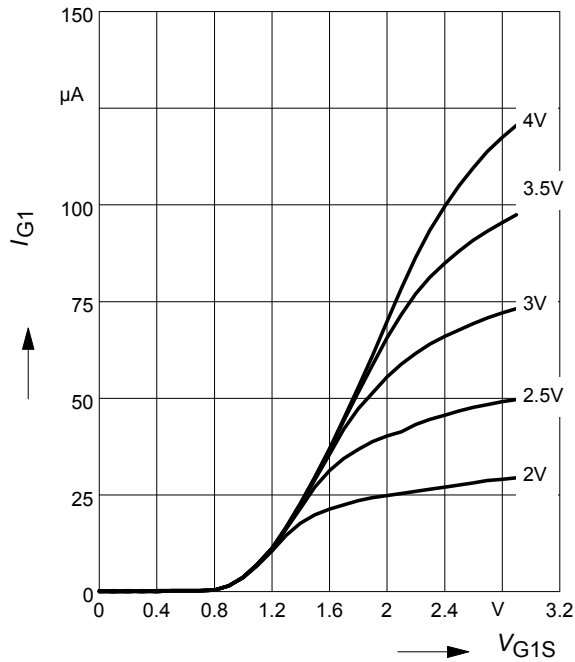
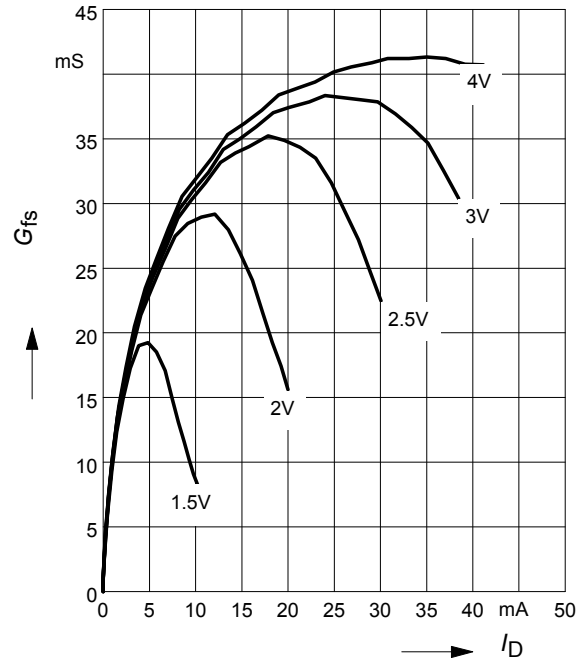
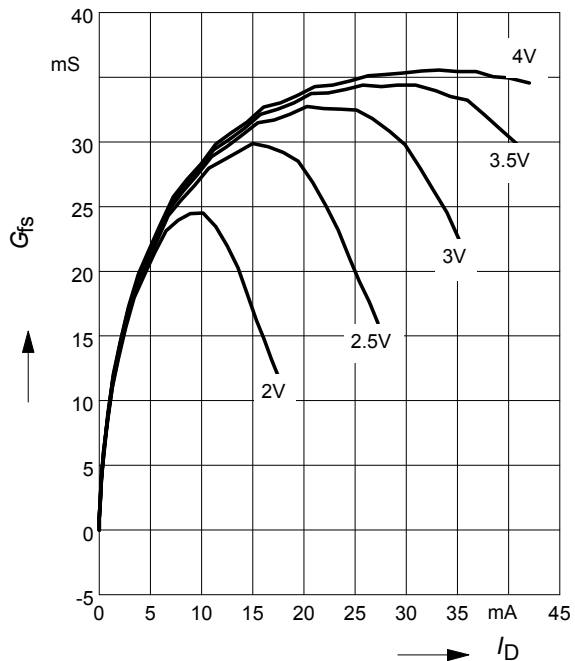
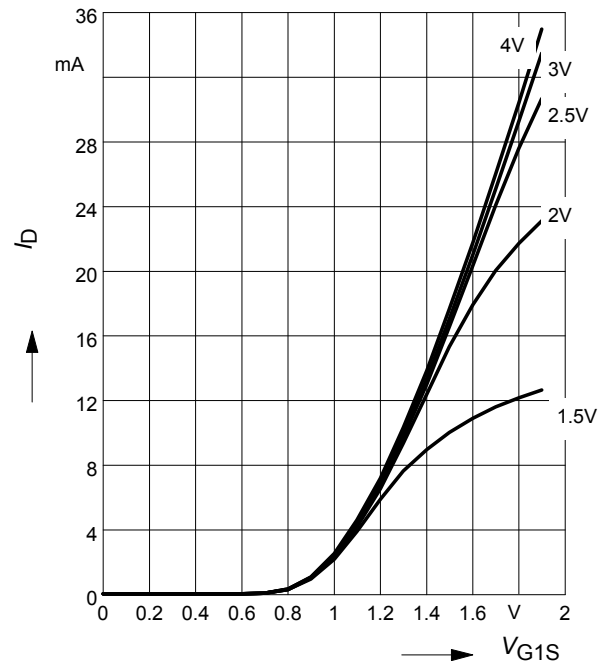
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics $V_{DS} = 5\text{ V}$, $V_{G2} = 4\text{ V}$, $I_D = 10\text{ mA}$ (verified by random sampling)					
Forward transconductance	g_{fs}				mS
amp. A		-	33	-	
amp. B		-	30	-	
Gate1 input capacitance	C_{g1ss}				pF
amp. A		-	2.2	-	
amp. B		-	2	-	
Output capacitance	C_{dss}				
amp. A		-	0.9	-	
amp. B		-	0.8	-	
Power gain	G_p				dB
$f = 800\text{ MHz}$, amp. A		-	24	-	
$f = 800\text{ MHz}$, amp. B		-	24	-	
$f = 45\text{ MHz}$, amp. A		-	34	-	
$f = 45\text{ MHz}$, amp. B		-	31	-	
Noise figure	F				dB
$f = 800\text{ MHz}$, amp. A		-	1.1	-	
$f = 800\text{ MHz}$, amp. B		-	1.2	-	
$f = 45\text{ MHz}$, amp. A		-	0.8	-	
$f = 45\text{ MHz}$, amp. B		-	0.9	-	
Gain control range	ΔG_p	-	45	-	
$V_{G2S} = 4 \dots 0\text{ V}$, $f = 800\text{ MHz}$					
Cross-modulation $k=1\%$, $f_W=50\text{MHz}$, $f_{unw}=60\text{MHz}$	X_{mod}				-
amp. A, AGC = 0 dB		-	97	-	
amp. B, AGC = 0 dB		-	96	-	
amp. A, AGC = 10 dB		-	94	-	
amp. B, AGC = 10 dB		-	91	-	
amp. A, AGC = 40 dB		-	105	-	
amp. B, AGC = 40 dB		-	103	-	

Functional diagram

shows pinning of BG5412K, switching pin at PIN 3



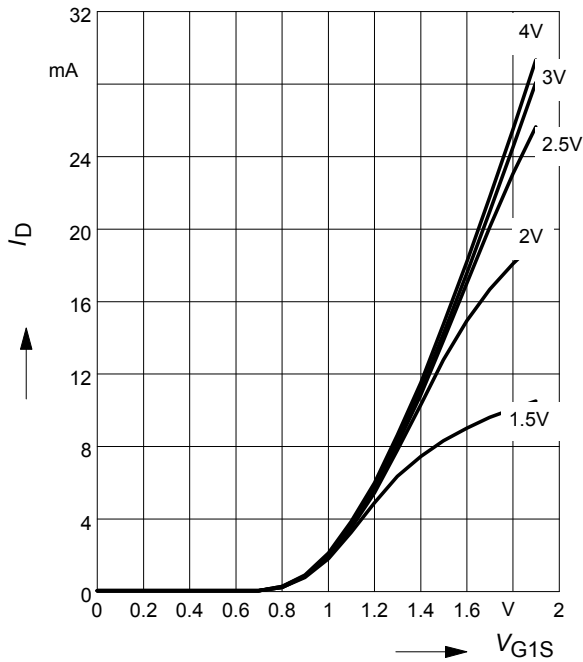
Total power dissipation $P_{\text{tot}} = f(T_S)$

Drain current $I_D = f(I_{G1})$
 $V_{G2S} = 4\text{V, amp. B}$
 $V_{DS} = 5\text{ V}$

Output characteristics $I_D = f(V_{DS})$
 $V_{G2} = 4\text{ V, amp. A}$
 $V_{G1} = \text{Parameter}$

Output characteristics $I_D = f(V_{DS})$
 $V_{G2} = 4\text{ V, amp. B}$
 $V_{G1} = \text{Parameter}$


Gate 1 current $I_{G1} = f(V_{G1S})$
 $V_{DS} = 5V$
 $V_{G2S} = \text{Parameter}$

Gate 1 forward transconductance
 $g_{fs} = f(I_D); \text{ amp.A}$
 $V_{DS} = 5V, V_{G2S} = \text{Parameter}$

Gate 1 forward transconductance
 $g_{fs} = f(I_D), \text{ amp. B}$
 $V_{DS} = 5V, V_{G2S} = \text{Parameter}$

Drain current $I_D = f(V_{G1S})$
 $V_{DS} = 5V, \text{ amp. A}$
 $V_{G2S} = \text{Parameter}$


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

$V_{DS} = 5V$, amp. B

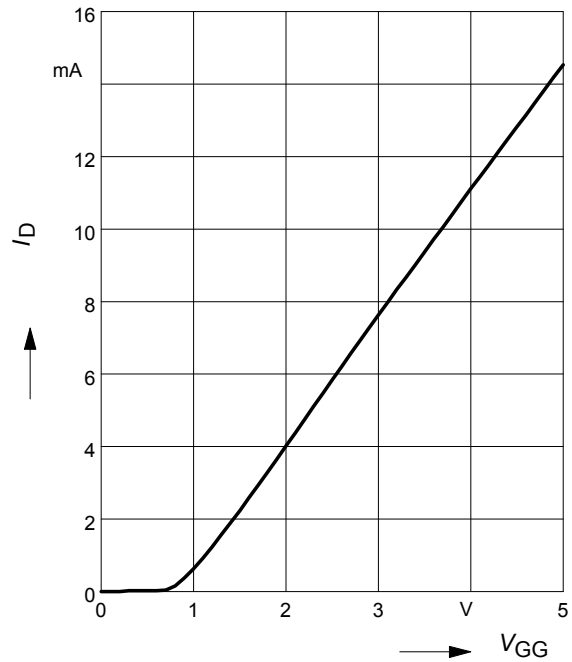
$V_{G2S} = \text{Parameter}$



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

$V_{DS} = 5V$, $V_{G2S} = 4V$, $R_{G1} = 100k\Omega$

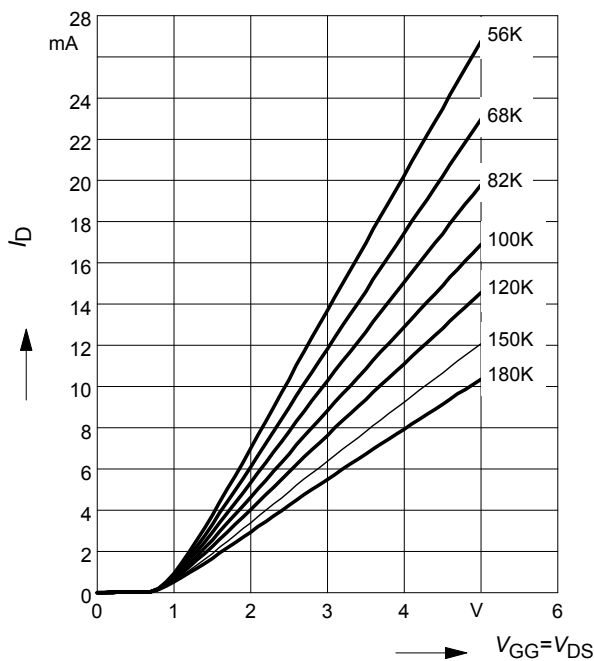
(connected to V_{GG} , $V_{GG} = \text{gate1 supply voltage}$)



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

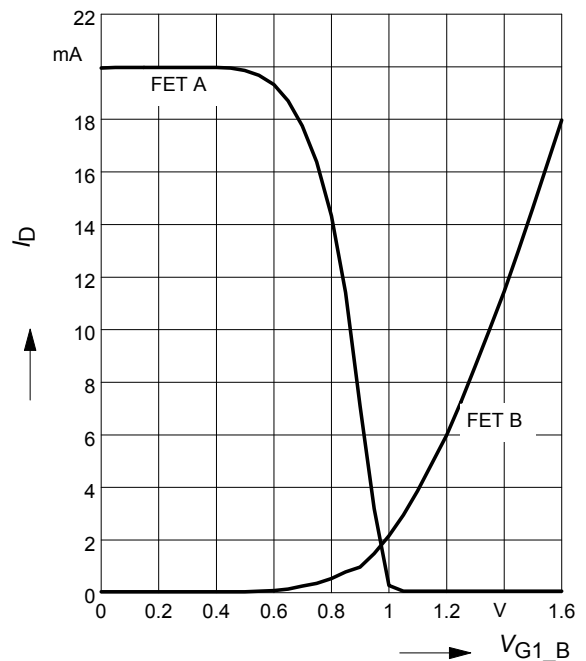
$V_{DS} = 5V$, $V_{G2S} = 4V$

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



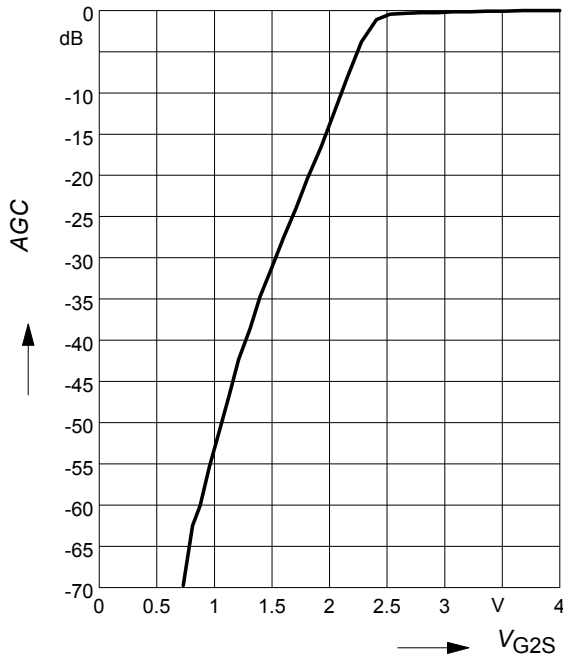
Drain current of FET A and FET B

as function of Gate 1 FET B



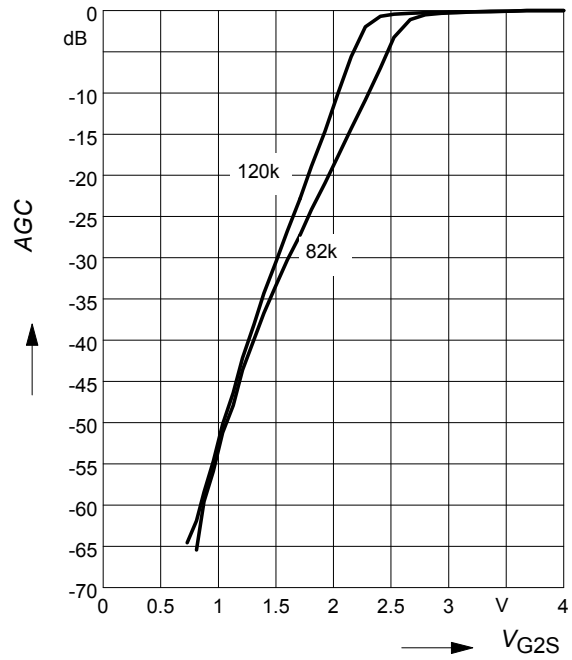
AGC characteristic $AGC = f(V_{G2S})$

$f = 45 \text{ MHz}$, amp. A



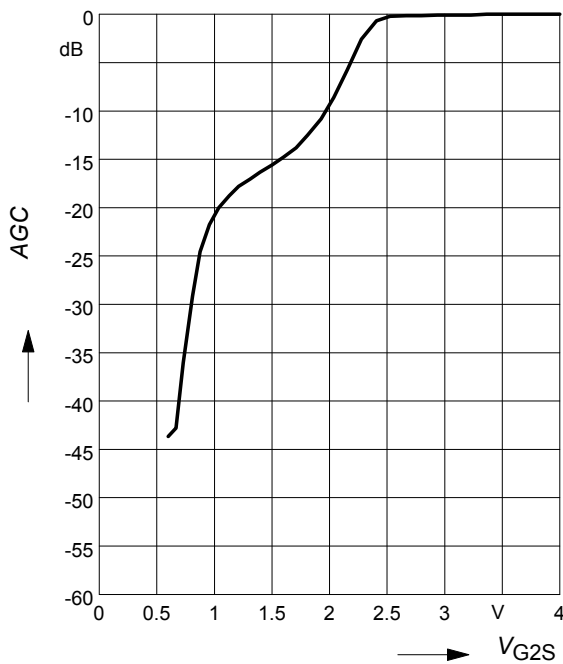
AGC characteristic $AGC = f(V_{G2S})$

$f = 45 \text{ MHz}$, amp. B



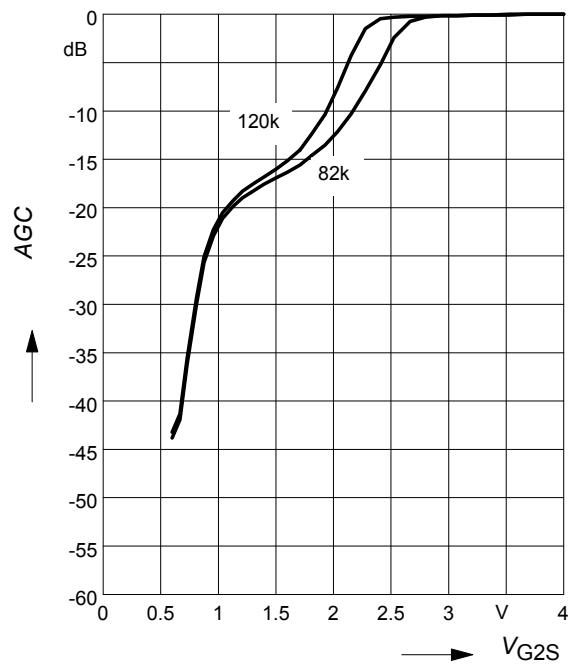
AGC characteristic $AGC = f(V_{G2S})$

$f = 800 \text{ MHz}$, amp. A



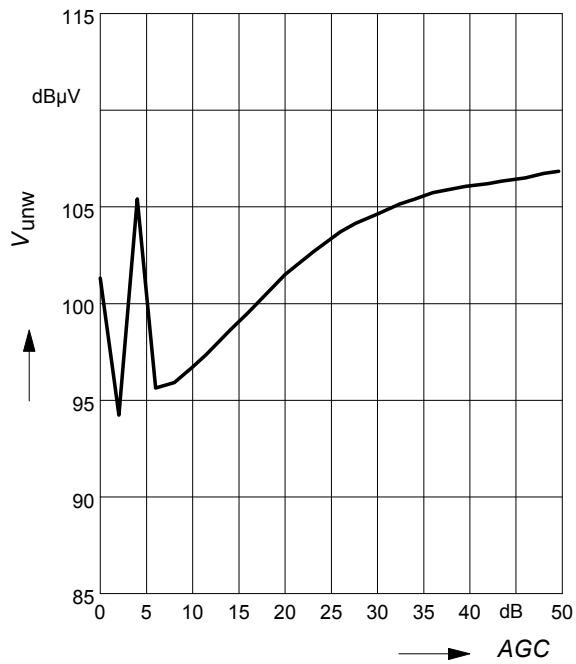
AGC characteristic $AGC = f(V_{G2S})$

$f = 800 \text{ MHz}$, amp. B

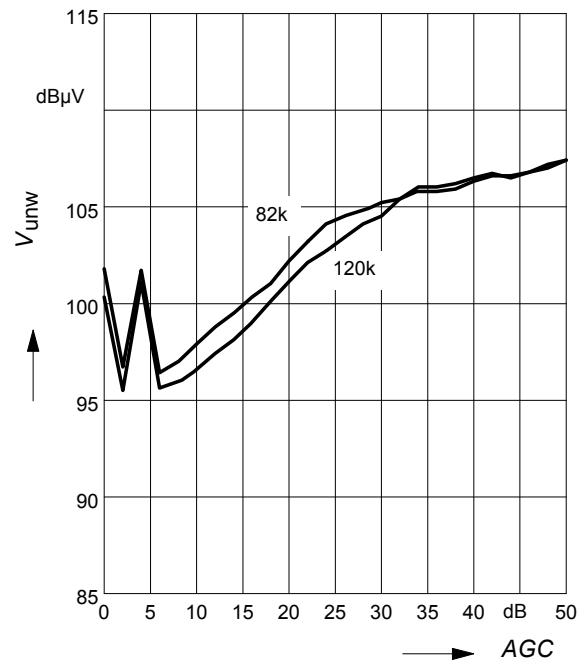


Crossmodulation $V_{unw} = (AGC)$
 $V_{DS} = 5\text{ V}, R_{g1} = 120\text{ k}\Omega$

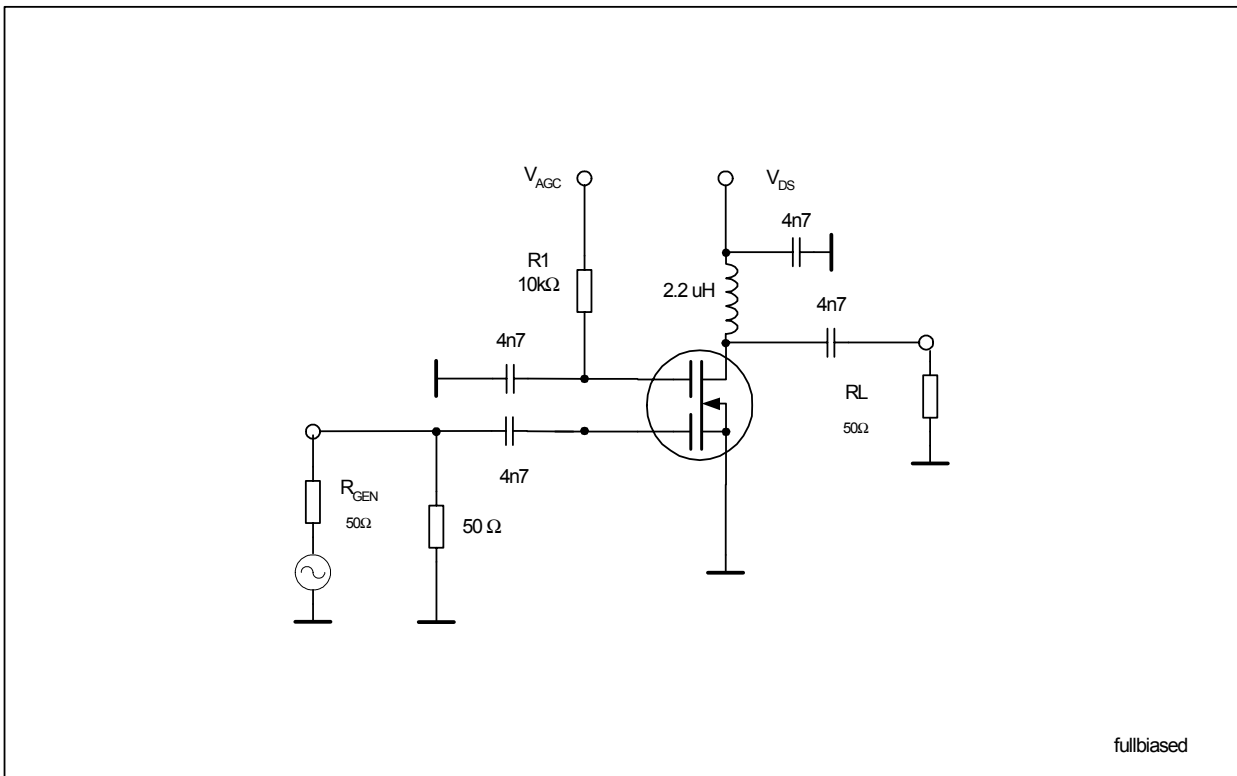
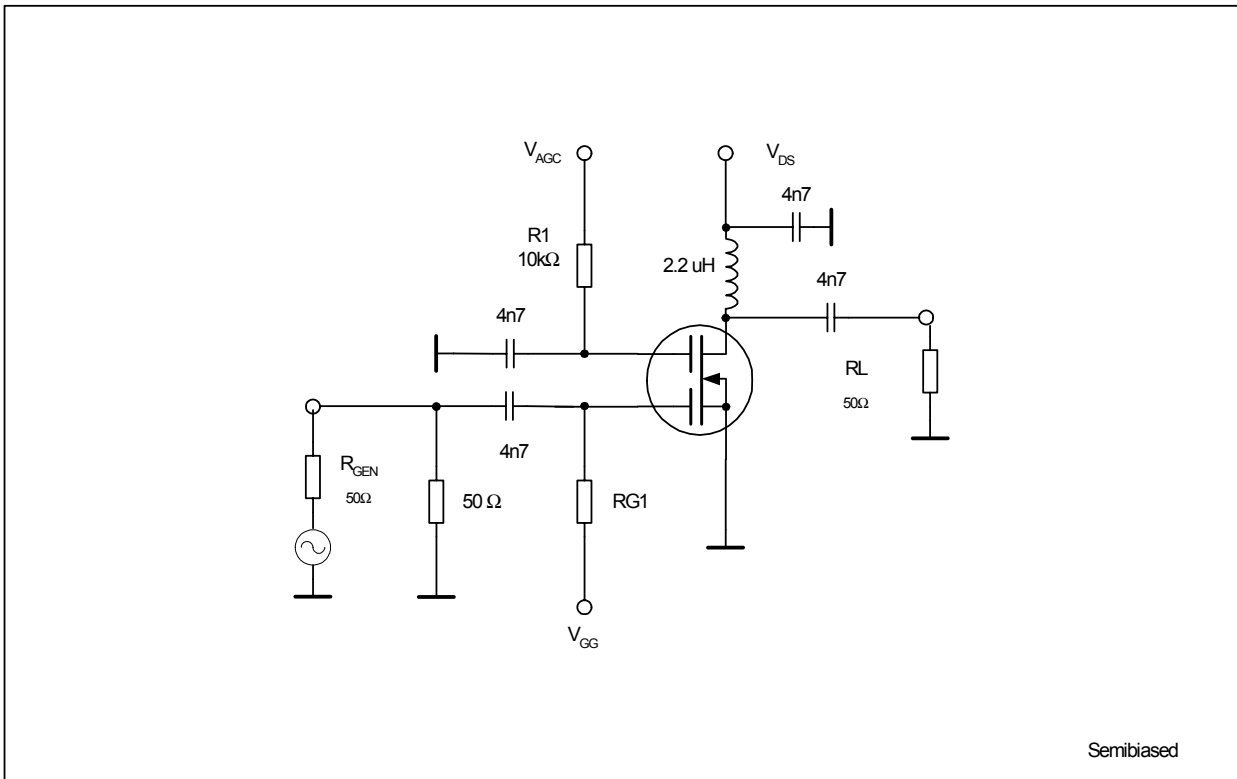
amp.A


Crossmodulation $V_{unw} = (AGC)$
 $V_{DS} = 5\text{ V}, R_{g1} = 56\text{ k}\Omega$

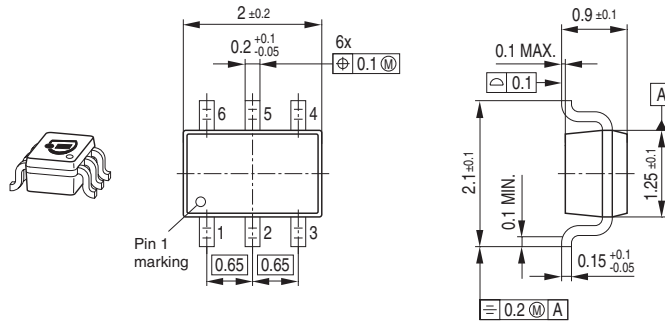
amp.B



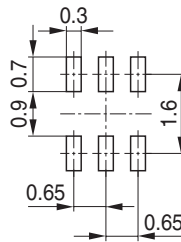
Crossmodulation test circuit



Package Outline

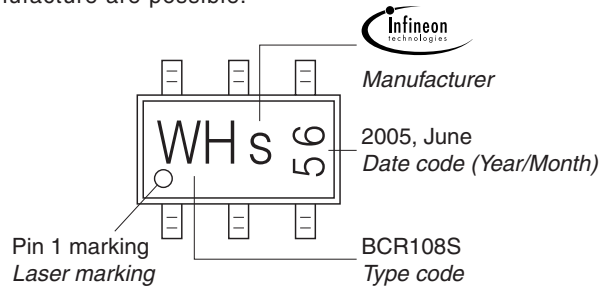


Foot Print



Marking Layout (Example)

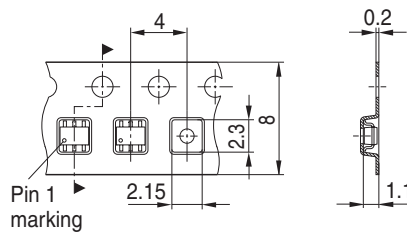
Small variations in positioning of Date code, Type code and Manufacture are possible.



Standard Packing

Reel ϕ 180 mm = 3.000 Pieces/Reel
 Reel ϕ 330 mm = 10.000 Pieces/Reel

For symmetric types no defined Pin 1 orientation in reel.



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