

M-Pulse Microwave

Low Operating Voltage, High f_T SiGe Microwave Transistors

MPSIG001

Features

- Designed for Battery Operation
- f_T to 14 GHz
- Low Voltage Oscillator and Amplifier
- Low Phase Noise and Noise Figure
- Hermetic Packaging and Die Available
- Can be Screened to JANTX, JANTXV Equivalent Levels

Case Styles 535

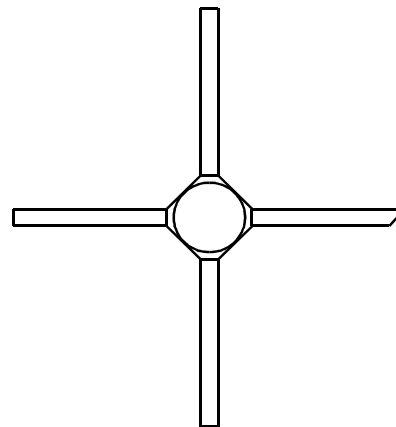
Description

The MPSIG001 family of low voltage, high gain bandwidth silicon SiGe transistors provides low noise figure and high gain at low bias voltages. These transistors are especially attractive for low operating voltage low noise amplifiers or driver amplifiers at frequencies to 5 GHz. They are also useful for low phase noise local oscillators and VCOs in battery operated equipment to 14 GHz.

The MPSIG001 family was designed to have low noise figure at operating voltages as low as 2 volts. These transistors also exhibit low phase noise in VCOs operating at 2.5 volts or less.

Because this transistor family was specifically designed to operate from low bias voltage, it has superior phase noise.

The MPSIG001 series transistors are available in hermetic Micro-X packages and in chip form (MPSIG00100). Other stripline and hermetic packages are available. The chip and hermetic packages can be screened to JANTX, JANTXV equivalent levels



Micro-X

Specification Subject to Change Without Notice

M-Pulse Microwave

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Tel (408) 432-1480

Fax (408) 432-3440

Maximum Ratings ($T_A = 25^\circ\text{C}$)**MPSIG001 Series**

Collector-Base Voltage	V_{CBO}	10 V
Collector-Emitter Voltage	V_{CE}	3 V
Emitter-Base Voltage	V_{EB}	1.5 V
Collector Current	I_C	75 mA
Junction Operating Temperature	T_J	200°C
Storage Temperature Chip or Ceramic Packages	T_S	-65°C to +200°C
Power Dissipation		
Micro-X Pkg (MPSIG001-535)	300 mW	150°C

Electrical Specifications @ 25°C**MPSIG001 Series**

Parameter of Test	Condition	Symbol	Units	MPSIG00100 Chip	MPSIG001-535 Micro-X
Gain Bandwidth Product	$V_{CE} = 2\text{ V}$ $I_C = 20\text{ mA}$	f_T	GHz	18 typ	18 typ
Insertion Power Gain	$V_{CE} = 2\text{ V}$ $I_C = 5\text{ mA}$ $f = .9\text{ GHz}$ $f = 2\text{ GHz}$	$ S_{21E} ^2$	dB	17 typ 11 typ	16 min 10.0 min
Noise Figure	$V_{CE} = 2\text{ V}$ $I_C = 5\text{ mA}$ $f = .9\text{ GHz}$ $f = 2\text{ GHz}$	NF	dB	.9 typ 1.1 typ	.9 typ 1.1 typ
Unilateral Gain	$V_{CE} = 2\text{ V}$ $I_C = 5\text{ mA}$ $f = 2\text{ GHz}$	GTU (max)	dB	13 typ	12 typ
Maximum Available Gain	$V_{CE} = 2\text{ V}$ $I_C = 5\text{ mA}$ $f = .9\text{ GHz}$ $f = 2\text{ GHz}$	MAG	dB	19 typ 12 typ	18 typ 11 typ
Output Power at 1 dB Compression	$V_{CE} = 2\text{ V}$ $I_C = 20\text{ mA}$ $f = .9\text{ GHz}$	P_{1dB}	dBm	15 typ	14 typ

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Electrical Specifications @ 25°C

Parameter	Condition	Symbol	Min	Typical	Max	Units
Collector Cut-off Current	$V_{CB} = 2$ volts $I_E = 0$ μ A	I_{CBO}	—	—	100	μ A
Collector to Emitter Breakdown Voltage	$I_C = 10$ μ A	BV_{CEO}	2.5	—	—	V
Collector to Base Breakdown Voltage	$I_C = 10$ μ A	BV_{CBO}	7	—	—	V
Collector to Emitter Breakdown Voltage	$I_E = 10$ μ A	BV_{EBO}	3	—	—	V
Collector to Substrate Breakdown Voltage	$I_R = 10$ μ A	BV_{SO}	30	45	—	V
Forward Current Gain	$V_{CE} = 3$ volts $I_C = 5$ mA	h_{FE}	20	100	300	—
Base Emitter Voltage	$V_{CC} = 10$ μ A	V_{BE}	700	—	800	mV

Typical Common Emitter Scattering Parameters in the Micro-X Package

MPSIG001-535, $V_{CE} = 2$ Volts, $I_C = 5$ mA

Frequency (MHz)	Mag. S_{11E} Angle	Mag. S_{21E} Angle	Mag. S_{12E} Angle	Mag S_{22E} Angle
100	.843 -17.6	15.1 165.5	0.021 78.2	0.962 -15.4
200	.792 -34.2	14.0 152.9	0.039 69.1	0.892 -29.7
300	.730 -49.3	12.7 142.5	0.056 62.7	0.805 -41.7
400	.671 -62.5	11.4 133.8	0.065 57.4	0.716 -51.8
500	.622 -73.4	10.2 127.1	0.072 53.7	0.639 -59.9
1000	.455 -108.9	6.1 108.4	0.094 50.4	0.377 -87.5
1500	.400 -132.9	4.2 97.6	0.108 53.9	0.280 -110.0
2000	.341 -148.7	3.3 92.9	0.123 59.3	0.208 -125.8
2500	.355 -167.8	2.8 89.7	0.142 64.8	0.208 -147.2
3000	.366 -179.4	2.4 91.1	0.160 71.4	0.204 -166.8

MPSIG001-535, $V_{CE} = 2$ Volts, $I_C = 10$ mA

Frequency (MHz)	Mag. S_{11E} Angle	Mag. S_{21E} Angle	Mag. S_{12E} Angle	Mag S_{22E} Angle
100	.708 -27.1	24.5 159.8	0.021 73.8	0.925 -22.7
200	.629 -51.2	21.8 143.8	0.034 65.2	0.801 -42.1
300	.562 -70.9	18.4 132.1	0.044 59.1	0.681 -56.7
400	.498 -86.2	15.6 123.5	0.052 56.4	0.577 -68.3
500	.461 -98.1	13.4 117.3	0.057 55.6	0.498 -76.9
1000	.343 -133.4	7.5 102.3	0.079 60.4	0.280 -108.7
1500	.337 -155.1	5.1 93.8	0.102 65.6	0.229 -134.4
2000	.297 -171.5	3.9 90.4	0.128 70.4	0.168 -171.8
2500	.352 173.6	3.3 88.7	0.157 73.6	0.214 171.9
3000	.373 162.8	2.9 90.9	0.178 78.1	0.235 135.9

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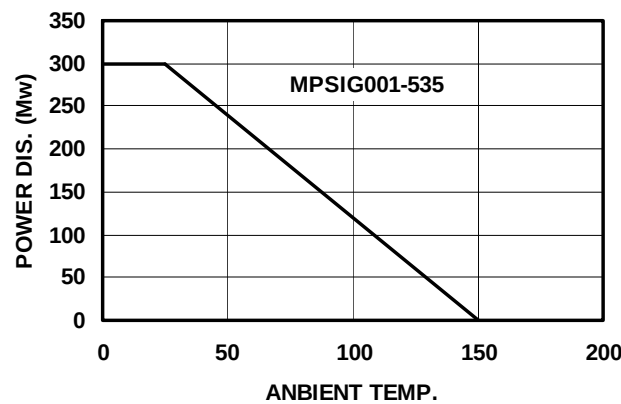
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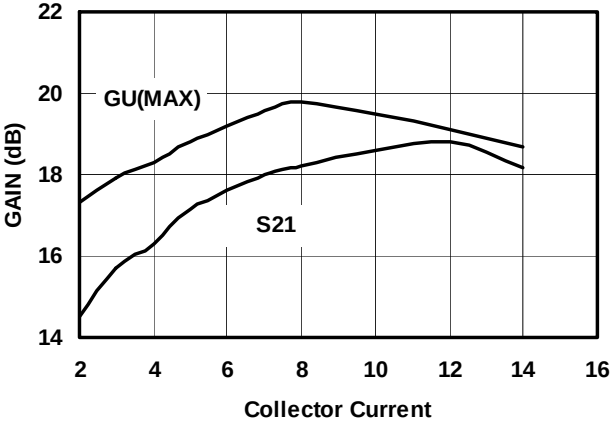
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MPSIG001-535
Typical Performance Curves

POWER DERATING CURVE



NOMINAL GAIN vs COLLECTOR CURRENT at $V_{CE} = 2$ Volts, $f = .9$ GHz (MPSIG001-535)



NOMINAL GAIN vs COLLECTOR CURRENT at $V_{CE} = 2$ Volts, $f = 2$ GHz (MPSIG001-535)

