M-Pulse Microwave

Low OperatingVoltage, 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

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

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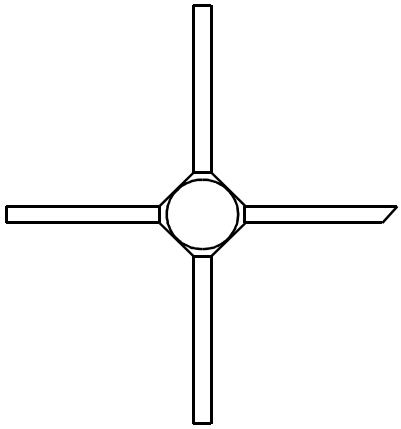
Case Styles 535



Micro-X

Maximum Ratings (T_A = 25°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 V I_C = 20 mA	f_T	GHz	18 typ	18 typ
Insertion Power Gain	V_{CE} = 2 V I_C = 5 mA f = .9 GHz f = 2 GHz	$\|S_{21E}\|^2$	dB	 17 typ 11 typ	 16 min 10.0 min
Noise Figure	V_{CE} = 2 V I_C = 5 mA f = .9 GHz f = 2 GHz	NF	dB	 .9 typ 1.1 typ	 .9 typ 1.1 typ
Unilateral Gain	V_{CE} = 2 V I_C = 5 mA f = 2 GHz	GTU (max)	dB	 13 typ	 12 typ
Maximum Available Gain	V_{CE} = 2 V I_C = 5 mA f = .9 GHz f = 2 GHz	MAG	dB	 19 typ 12 typ	 18 typ 11 typ
Output Power at 1 dB Compression	V_{CE} = 2 V I_C = 20 mA f = .9 GHz	P_{1dB}	dBm	 15 typ	 14 typ

Electrical Specifications @ 25°C

Parameter	Condition	Symbol	Min	Typical	Max	Units
Collector Cut-off Current	V_{CB} = 2 volts I_E = 0 μA	I_{CBO}	—	—	100	μA
Collector to Emitter Beakdown Voltage	Ic = 10 uA	BVCEO	2.5	—	—	V
Collector to Base Breakdown Voltage	I_C = 10 uA	BVCBO	7	—	—	V
Collector to Emitter Breakdown Voltage	I_E = 10 uA	BVEBO	3	—	—	V
Collector to Substrate Breakdown Voltage	I_R = 10 uA	BVSO	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 uA	VBE	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)	S_{11E} Mag.	S_{11E} Angle	S_{21E} Mag.	S_{21E} Angle	S_{12E} Mag.	S_{12E} Angle	S_{22E} 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)	S_{11E} Mag.	S_{11E} Angle	S_{21E} Mag.	S_{21E} Angle	S_{12E} Mag.	S_{12E} Angle	S_{22E} 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	0577	-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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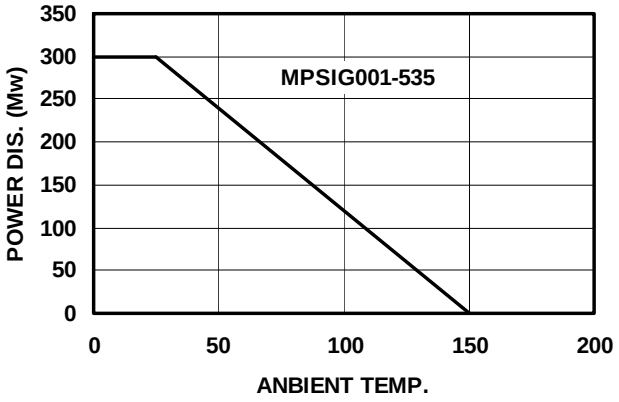
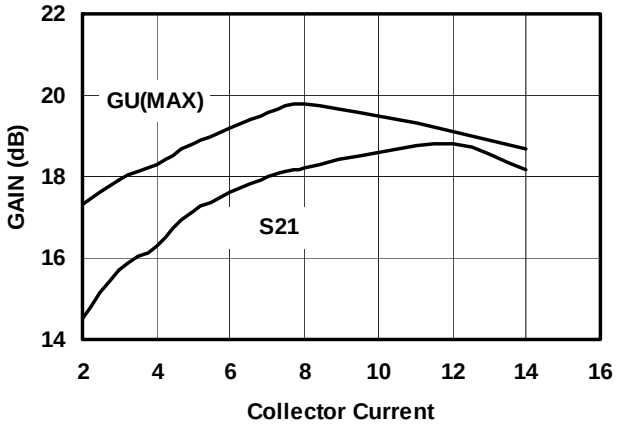
MPSIG001-535
Typical Performance Curves

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)