



ATF-10135
2-12 GHz Low Noise
Gallium Arsenide FET

T-31-25

Features

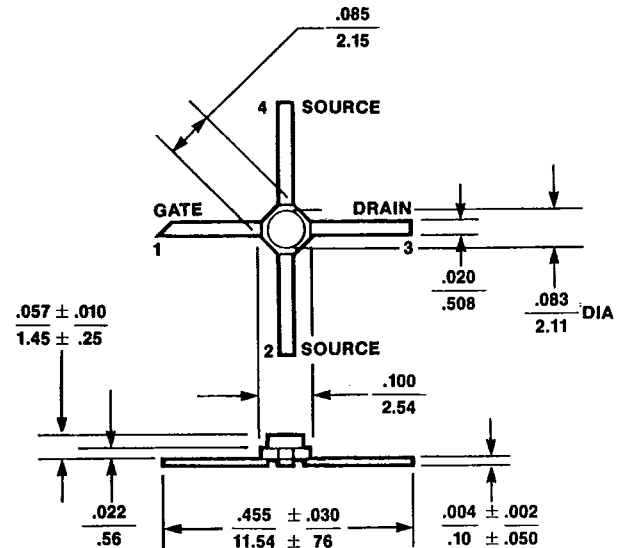
- Low Noise Figure
0.5 dB typical at 4 GHz
- Low Bias
 $V_{DS}=2V$, $I_{DS}=20$ mA
- High Associated Gain
13.0 dB typical at 4 GHz
- High Output Power
20.0 dBm typical $P_{1\text{ dB}}$ at 4 GHz
- Cost Effective Ceramic Microstrip Package

Description

Avantek's ATF-10135 is a high performance gallium arsenide Schottky-barrier-gate field effect transistor housed in a cost effective microstrip package. Its premium noise figure makes this device appropriate for use in the first stage of low noise amplifiers operating in the 2-12 GHz frequency range.

This GaAs FET device has a nominal 0.3 micron gate length using airbridge interconnects between drain fingers. Total gate periphery is 500 micron. Proven gold based metalization systems and nitride passivation assure a rugged, reliable device.

Avantek micro-X Package



NOTES:
 (unless otherwise specified)
 1. Dimensions are in mm
 2. Tolerances
 in .xxx = $\pm .005$
 mm .xx = $\pm .13$

Electrical Specifications, $T_A=25^\circ\text{C}$

Symbol	Parameters: Test Conditions	Units	Min.	Typ.	Max.
NF_O	Optimum Noise Figure: $V_{DS}=2V$, $I_{DS}=20$ mA	f=2 GHz		0.4	0.6
		f=4 GHz		0.5	
		f=6 GHz		0.8	
G_A	Gain @ NF_O : $V_{DS}=2V$, $I_{DS}=20$ mA	f=2 GHz		16.5	
		f=4 GHz	12.0	13.0	
		f=6 GHz		11.0	
$P_{1\text{ dB}}$	Output Power @ 1 dB Gain Compression $V_{DS}=4V$, $I_{DS}=70$ mA	f=4 GHz		20.0	
$G_{1\text{ dB}}$	Gain @ 1 dB Compression $V_{DS}=4V$, $I_{DS}=70$ mA	f=4 GHz		12.0	
g_m	Transconductance: $V_{DS}=2V$, $V_{GS}=0V$	mmho	80	140	
I_{DSS}	Saturated Drain Current: $V_{DS}=2V$, $V_{GS}=0V$	mA	50	130	180
V_P	Pinchoff Voltage: $V_{DS}=2V$, $I_{DS}=1$ mA	V	-3.0	-1.3	-0.8

ATF-10135, 2–12 GHz
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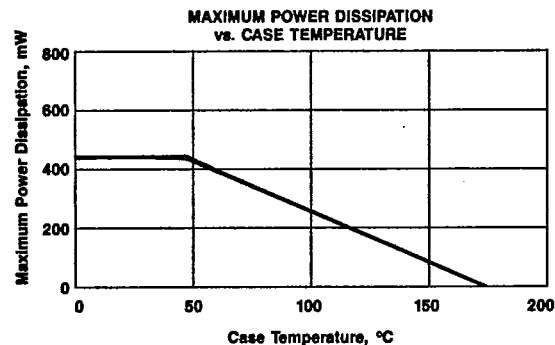
Absolute Maximum Ratings

Parameter	Symbol	Absolute Maximum ¹
Drain-Source Voltage	V_{DS}	+5V
Gate-Source Voltage	V_{GS}	-4V
Drain Current	I_{DS}	I_{DSS}
Total Power Dissipation ²	P_T	430 mW
Channel Temperature	T_{CH}	175°C
Storage Temperature ³	T_{STG}	175°C

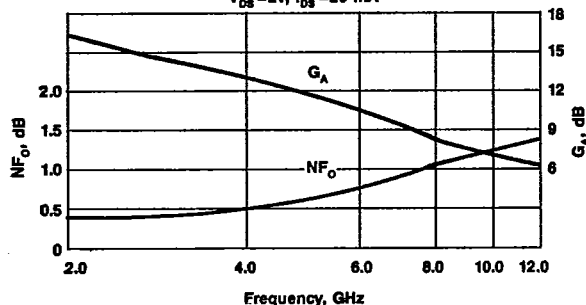
Thermal Resistance: $\theta_{JC} = 350^\circ \text{C/W}$; $T_{CH} = 150^\circ \text{C}$ Liquid Crystal Measurement; $1 \mu\text{m}$ Spot Size⁴

Notes:

- Operation of this device above any one of these parameters may cause permanent damage.
- Case Temperature = 25°C .
- Storage above $+150^\circ \text{C}$ may tarnish the leads of this package making it difficult to solder into a circuit. After a device has been soldered into a circuit, it may be safely stored up to 175°C .
- The small spot size of this technique results in a higher, though more accurate determination of θ_{JC} than do alternate methods. See Applications section for more information.

Typical Performance Curves, $T_A = 25^\circ \text{C}$
 (unless otherwise noted)


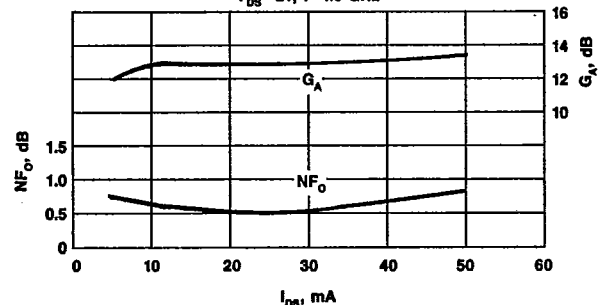
OPTIMUM NOISE FIGURE AND ASSOCIATED GAIN vs. FREQUENCY
 $V_{DS} = 2V$, $I_{DS} = 20 \text{ mA}$



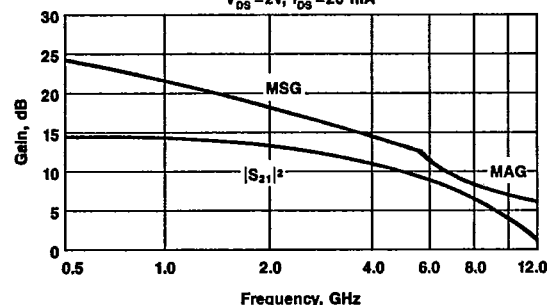
NOISE PARAMETERS
 $V_{DS} = 2V$, $I_{DS} = 20 \text{ mA}$

Freq. GHz	NF_0 dB	Mag Γ_0	Ang	$R_n/50$
2.0	0.4	.70	47	.46
4.0	0.5	.39	126	.36
6.0	0.8	.36	-170	.12
8.0	1.1	.45	-100	.38

OPTIMUM NOISE FIGURE AND ASSOCIATED GAIN vs. I_{DS}
 $V_{DS} = 2V$, $f = 4.0 \text{ GHz}$



INSERTION POWER GAIN, MAXIMUM AVAILABLE GAIN AND MAXIMUM STABLE GAIN vs. FREQUENCY
 $V_{DS} = 2V$, $I_{DS} = 20 \text{ mA}$

**Typical Scattering Parameters, Common Source** $V_{DS} = 2V$, $I_{DS} = 20 \text{ mA}$

Freq. GHz	S_{11}		S_{21}			S_{12}			S_{22}	
	Mag	Ang	dB	Mag	Ang	dB	Mag	Ang	Mag	Ang
0.5	.98	-18	14.5	5.32	163	-34.0	.020	78	.35	-9
1.0	.93	-33	14.3	5.19	147	-28.4	.038	67	.36	-19
2.0	.79	-66	13.3	4.64	113	-22.6	.074	59	.30	-31
3.0	.64	-94	12.2	4.07	87	-19.2	.110	44	.27	-42
4.0	.54	-120	11.1	3.60	61	-17.3	.137	31	.22	-49
5.0	.47	-155	10.1	3.20	37	-15.5	.167	13	.16	-54
6.0	.45	162	9.2	2.88	13	-14.3	.193	-2	.08	-17
7.0	.50	120	8.0	2.51	-10	-13.9	.203	-19	.16	45
8.0	.60	87	6.4	2.09	-32	-13.6	.210	-36	.32	48
9.0	.68	61	4.9	1.75	-51	-13.6	.209	-46	.44	38
10.0	.73	42	3.6	1.52	-66	-13.7	.207	-58	.51	34
11.0	.77	26	2.0	1.26	-82	-13.8	.205	-73	.54	27
12.0	.80	14	1.0	1.12	-97	-14.0	.200	-82	.54	15

LOW NOISE AND GEN. PURPOSE GaAs FETs