

**L-Band Radar Transistor - GaN**

- GaN on SiC HEMT Technology
- $P_{OUT-PK} \geq 45W$  @ 444 x 7 us ON, 6us OFF, 22.7% / 50V
- 0.96-1.22GHz Instantaneous Operating Frequency Range
- Internal Impedance Pre-matched Device
- Depletion Mode Device
- Negative Gate Voltage and Bias Sequencing Required
- Specified For Use Under Class AB Operation
- Metal Based Package Sealed With Ceramic-Epoxy Lid
- Gold Metallization System: Chip - Wire Bond - Package
- Package Size: W=0.800" (20.32mm), L=0.230" (5.84mm)
- "S" Package Size: W=0.390" (9.91mm), L=0.230" (5.84mm)
- 100% High Power RF Tested in Broadband RF Test Fixture



PARAMETER	SYM	MIN	TYP	MAX	UNI	TEST CONDITIONS
<b>DC ELECTRICAL SPECIFICATIONS</b>						
Drain Leakage Current	$I_{D-OFF}$	--	--	1.2	mA	$V_{DS}=50V, V_{GS}=-6V, T_{F1}, S1$
Gate Threshold Voltage	$V_{GS-TH}$	--	-2.5	--	V	$V_{DS}=50V, I_D=50mA, T_{F1}, BD$
<b>RF ELECTRICAL SPECIFICATIONS</b>						
Input Return Loss	IRL	-18	-10	-7	dB	PIN1, V1, $I_{DQ1}$ , PW1, DF1, F1, F2, F3, ,S1
Power Output	$P_O$	45	60	85	W	PIN1, V1, $I_{DQ1}$ , PW1, DF1, F1, F2, F3, ,S1
Power Gain	$G_p$	18.8	20.5	21.5	dB	PIN1, V1, $I_{DQ1}$ , PW1, DF1, F1, F2, F3, ,S1
Drain Efficiency	$N_D$	50	57	70	%	PIN1, V1, $I_{DQ1}$ , PW1, DF1, F1, F2, F3, ,S1
Pulse Amplitude Droop	D	-0.50	-0.30	+0.20	dB	PIN1, V1, $I_{DQ1}$ , PW1, DF1, F1, F2, F3, ,S1
Load Mismatch Stability	VSWR-S	2:1	--	--	--	PIN1, V1, $I_{DQ1}$ , PW1, DF1, F1, F2, F3, ,S1
Load Mismatch Tolerance	LMT	5:1	--	--	--	PIN1, V1, $I_{DQ1}$ , PW1, DF1, F1, F2, F3, ,S1

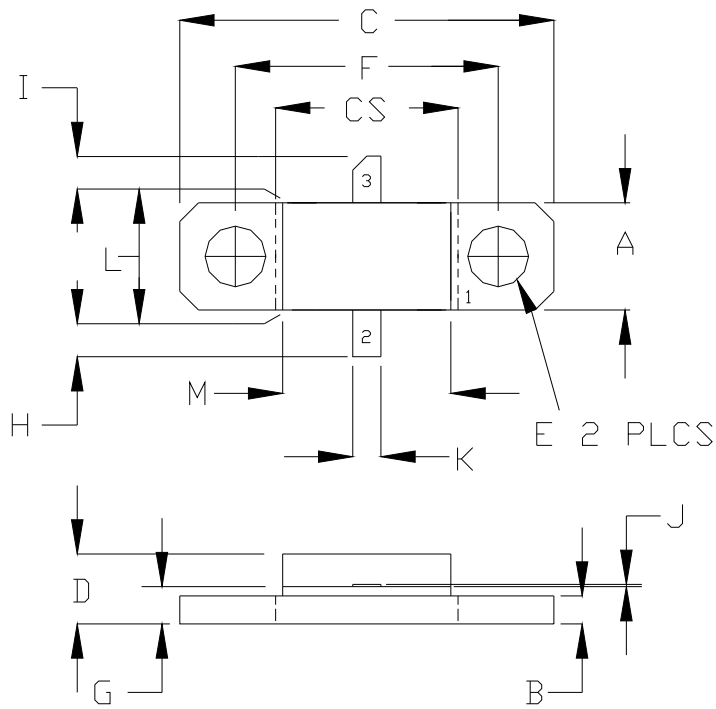
DC & RF TEST CONDITIONS	SYM	MIN	NOM	MAX	UNITS	NOTES
Input Power 1	PIN1	--	0.6	--	W	--
Drain Supply Voltage 1	V1	--	50	--	V	--
Quiescent Drain Current 1	$I_{DQ1}$	18	20	25	mA	--
Pulse Width 1	PW1	--	*	--	Ms	* Pulse Train 444 x 7 us ON, 6us OFF, 22.7%
Duty Factor 1	DF1	--	6.4	--	%	--
Frequency 1	F1	--	0.96	--	GHz	--
Frequency 2	F2	--	1.090	--	GHz	--
Frequency 3	F3	--	1.220	--	GHz	--
Flange Temperature 1	$T_{F1}$	20	25	30	°C	--
Screening Level 1	S1	--	100	--	%	--

PARAMETER	SYM	MIN	MAX	UNITS	SCREEN	CONDITIONS
<b>MAXIMUM RATINGS</b>						
Drain-Source Voltage	$V_{DS}$	--	60	V	BD	$T_F = 25^\circ\text{C}$
Gate-Source Voltage	$V_{GS}$	-10	0	V	BD	$T_F = 25^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55	+150	$^\circ\text{C}$	BD	--
Operating Junction Temperature	$T_J$	-55	+200	$^\circ\text{C}$	BD	--
<b>PROCESS SPECIFICATIONS</b>						
DC Wafer Probe	--	--	--	--	100%	Per Integra Spec
Wafer DC, RF Qualification	--	--	--	--	Q1	Per Integra Spec
Wire Bond Strength	--	--	--	--	LM	Per Integra Spec
Pre-cap Visual Inspection	--	--	--	--	100%	Per Integra Spec
Gross Leak Test – MIL-STD-750D	--	--	--	--	100%	Method 1071.6 C
<b>THERMAL RESISTANCE</b>						
Peak Thermal Resistance Per Rated RF Specification	$R_{TH(JC)}$	--	1.8	$^\circ\text{C/W}$	BD	$T_F = 25^\circ\text{C}$
<b>SCREENING LEVELS</b>						
Parameter Qualified By Design	BD	--	--	--	--	--
Parameter Qualified By 3 Pieces (min) Per Wafer	Q1	--	--	--	--	--
Parameter Qualified By Assembly Line Monitor	LM	--	--	--	--	--

RF TEST FIXTURE – BROADBAND		
▶ Broadband RF Test Fixture. Provides Device Impedance Matching to 50Ω Across the Rated Operating Frequency Range.		
▶ Electronic CAD Drawing File Available Upon Request. Includes Circuit Dimensions and Parts List.		
▶ Reference Design PCB: Rogers RTD6010.2-02511, DK=10.7.		
FREQUENCY (GHz)	$Z_{IF}(\Omega)$	$Z_{OF}(\Omega)$
0.96	3.4 - j 3.1	12.1 + j 5.4
1.090	3.3 - j 1.3	12.1 + j 3.6
1.220	3.4 + j 0.4	11.4 + j 2.9
Impedance Definition		

DC BIAS SEQUENCING	
Turn ON GaN Device	Turn OFF GaN Device
<ol style="list-style-type: none"> <li>1. RF Power OFF</li> <li>2. Set VGS = -5V (Negative Voltage to pinch off)</li> <li>3. Measure VDS impedance, should be pinched off.</li> <li>4. Turn ON VDD voltage.</li> <li>5. Slowly increase VGS until bias current IDQ is set.</li> <li>6. Turn ON RF Power</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn OFF RF Power</li> <li>2. Turn OFF VDD voltage</li> <li>3. After VDD is discharged, set VGS = -5V</li> <li>4. Turn OFF VGS voltage.</li> </ol>

**PACKAGE OUTLINE DRAWING**



'S' VERSION USE DIM CS  
NON 'S' VERSION USE DIM C

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.225	0.235	5.71	5.96
B	0.055	0.065	1.40	1.65
C	0.795	0.805	20.19	20.44
CS	0.385	0.395	9.78	10.03
D	0.140	0.160	3.55	4.06
E	0.125	0.135	3.18	3.43
F	0.557	0.567	14.14	14.40
G	0.077	0.087	1.95	2.20
H	0.093	0.107	2.36	2.72
I	0.093	0.107	2.36	2.72
J	0.004	0.006	0.10	0.15
K	0.055	0.065	1.40	1.65
L	0.225	0.235	5.71	5.96
M	0.355	0.365	9.01	9.27

PIN SCHEDULE	
1	SOURCE
2	GATE
3	DRAIN

**DEFINITIONS****DATA SHEET STATUS**

Proposed Specification	This data sheet contains proposed specifications.
Preliminary Specification	This data sheet contains specifications based on preliminary measurements and data.
Product Specification	This data sheet contains final product specifications.

**MAXIMUM RATINGS**

Stress above one or more of the maximum ratings may cause permanent damage to the device. These are maximum ratings only operation of the device at these or at any other conditions above those given in the characteristics sections of the specification is not implied. Exposure to maximum values for extended periods of time may affect device reliability.

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