

Part Number: IGN5459M80 (Preliminary)

Integra

TECHNOLOGIES, INC.

C-Band Radar Transistor

IGN5459M80 is an internally pre-matched, gallium nitride (GaN) high electron mobility transistor (HEMT). This part is designed for C-Band radar applications operating over the 5.4 – 5.9 GHz instantaneous frequency band. Under 300us / 10% pulse conditions it supplies a minimum of 80 watts of peak output power with 12dB gain typically. Specified operation is with Class AB bias. When appropriately rated, it is operable under a wide range of pulse widths and duty factors. It operates with spectral purity into all phases of 3:1 output load VSWR. All devices are 100% screened for large signal RF parameters in a fixed tuned broadband matching circuit / test fixture. The use of external tuners is not allowed during screening.



GaN on SiC FET

- High Power Gain
- Excellent Thermal Stability
- Gold Metal

Gold Metal System

- Complete Gold System
- Gold Bond Wires
- Gold Package Metal
- Maximum Reliability

Class AB

- Specified with AB bias

Internal Impedance Matching

- Ease of Use
- Input and Output
- Ultra Low Loss Design

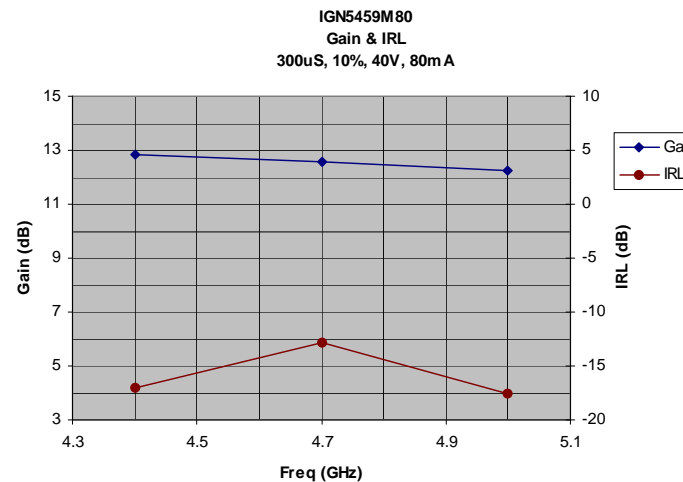
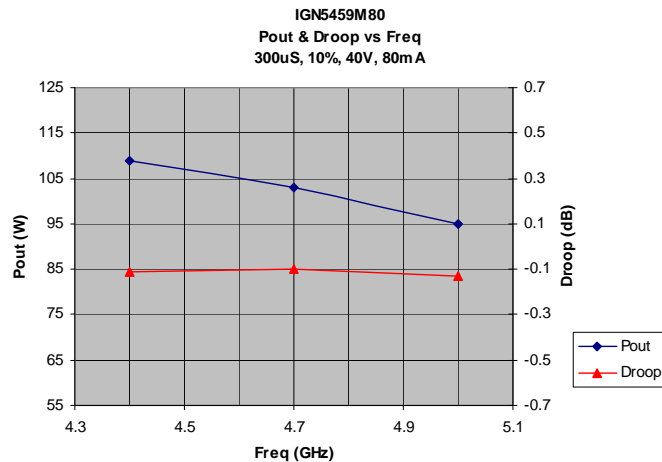
Metal - Ceramic

- Metal Based
- Epoxy Seal

High Power RF Test / Fixture

- Broadband
- Matched to 50 Ω (ohms)
- Long-term Correlation
- 100% Device RF Screening
- No External Tuning required

PRELIMINARY RF DATA



MAXIMUM RATINGS

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Drain-Source Voltage	V_{DS}	--	40	V	--
BD	Gate-Source Voltage	V_{GS}	-10	0	V	--
BD	Storage Temperature Range	T_{STG}	-55	+150	°C	--
BD	Operating Junction Temperature Range	T_J	-55	+200	°C	--
Note	Screen 'BD' = parameter qualified By Design.					

THERMAL CHARACTERISTICS

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
BD	Thermal Resistance	$R_{TH(JC)}$	--	0.26	°C/W	$V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=25\pm5^\circ C, P_{OUT}=80W$
Note	Screen 'BD' = parameter qualified By Design.					

PROCESSING SPECIFICATIONS

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	DC Wafer Probe	--	--	--	--	Per Integra specification.
Q1	Wafer DC and RF Qualification	--	--	--	--	Per Integra specification.
LM	Wire Bond Strength	--	--	--	--	Line monitor per Integra specification.
100%	Pre-cap visual inspection	--	--	--	--	Per Integra specification
100%	Gross leak test	--	--	--	--	MIL-STD-750D, Method 1071.6, Test Condition C
Note	Screen 'Q1' = parameter is qualified by assembly and test of 3 pieces minimum per wafer.					
Note	Screen 'LM' = parameter is qualified by assembly line monitor.					



DC ELECTRICAL CHARACTERISTICS

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Drain-Source Breakdown Voltage	BV_{DSS}	80	--	V	$I_{DS} = 20mA, V_{GS} = -8V, T_F = 25\pm5^\circ C$
BD	Drain Leakage Current	I_{DSS}	--	5.0	mA	$V_{DS} = 40V, V_{GS} = -8V, T_F = 25\pm5^\circ C$
100%	Operating Gate Voltage	V_{GS}	-5.0	-3.0	V	$V_{DS} = 40V, I_D = 0.500A, T_F = 25\pm5^\circ C$
BD	Gate Leakage Current	I_{GSS}	--	5.0	mA	$V_{GS} = -5V, V_{DS} = 40V, T_F = 25\pm5^\circ C$

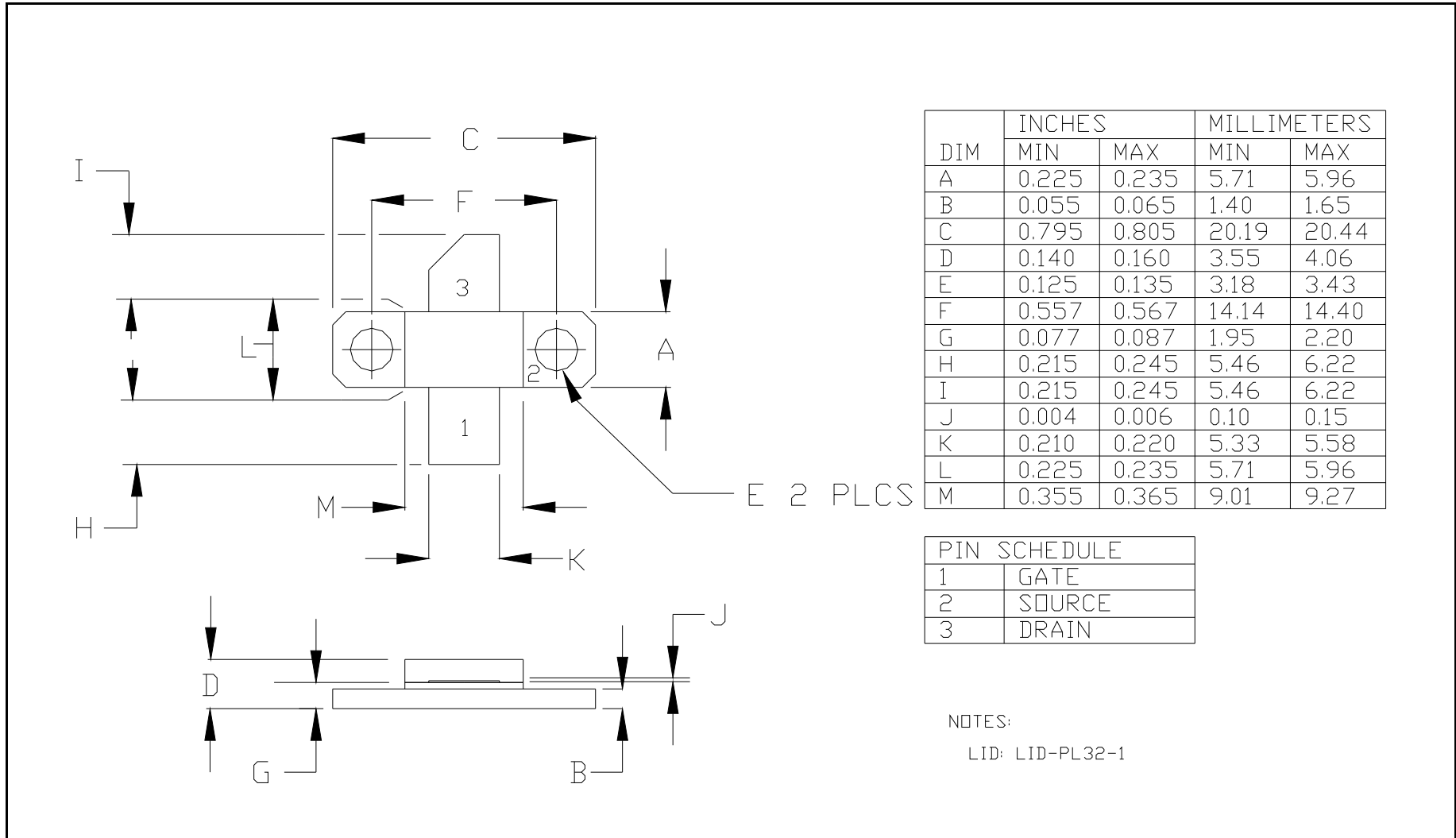
RF ELECTRICAL CHARACTERISTICS

Screen	Parameter	Symbol	Min	Max	Units	Test Conditions
100%	Input Return Loss	RL	-20	-8	dB	$V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{IN}=P_{IN1}, F=F1, F2, F3.$
100%	Output Power	P_O	80	130	W	$V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{IN}=P_{IN1}, F=F1, F2, F3.$
100%	Drain Current – Peak	I_D	4.0	6.0	A	$V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{IN}=P_{IN1}, F=F1, F2, F3.$
100%	Pulse Amplitude Droop	Droop	0.5	-0.5	dB	$V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{IN}=P_{IN1}, F=F1, F2, F3.$
100%	Power Gain	Gp	11	13	dB	$V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{IN}=P_{IN1}, F=F1, F2, F3.$
100%	3:1 Load Mismatch Stability	VSWR-S	S	--	--	$V_{DD}=V1, I_{DQ}=I_{DQ1}, PW=PW1, DF=DF1, T_F=T_{F1}, P_{IN}=P_{IN1}, F=F1, F2, F3.$ Rotate 3:1 output VSWR through 360° phase. No oscillatory or pulse break-up characteristics allowed on detected output pulse. All non-harmonically related signals must be at least -65 dBc.
Note 1	$V1 = 40V; I_{DQ1} = 80mA; PW1 = 300\mu s; DF1 = 10\%$					
Note 2	Input Power Test Levels: $P_{IN1} = 5.6W$					
Note 3	Test Frequencies: $F1 = 5.40\text{ GHz}, F2 = 5.65\text{ GHz}, F3 = 5.90\text{ GHz}.$					
Note 4	$T_{F1} = 25\pm 5^\circ C =$ Device flange temperature.					
Note 5	Screen 'BD' = parameter qualified By Design.					

RF TEST FIXTURE IMPEDANCE CHARACTERISTICS

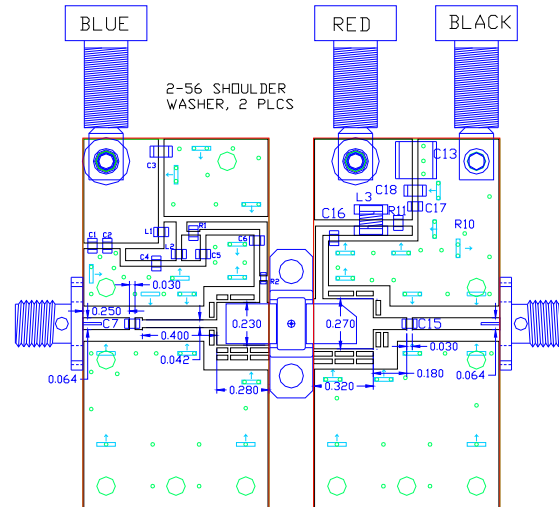
Frequency (GHz)	$Z_{IF} (\Omega)$	$Z_{OF} (\Omega)$
5.40	4.4 – j8.6	5.0 – j5.7
5.65	4.4 – j6.8	5.0 – j4.9
5.90	4.4 – j5.2	5.0 – j3.5
Impedance Definition		

PACKAGE DIMENSIONAL OUTLINE DRAWING



RF TEST FIXTURE

ASSEMBLY DRAWING



PARTS LIST

- PC Board Type: ROGERS RD4350B-03011, 30mil.
- 1/1oz. Copper
- Aluminum Heatsink: -11
- Input PC Board Carrier: -3 (1')
- Output PC Board Carrier: -3 (1')
- Transistor Copper Carrier: -05
- RF connector: DS #2052-5636-02
- Ground Plated thru vias
- Banana jack Black -1 place
- Banana jack Blue - 1 place
- Banana jack Red -1 place
- C1,C4,C5: CAP.0.1UF,0805,50V
- C2,C17: CAP.18PF,ATC600F120
- C7,C15: CAP.12PF,ATC600F120,EDGE MNT
- C6,C16: CAP.15PF,ATC600F1R5, EDGE MNT
- C3,C18: CAP.1uF,1206
- C13: CAP.10uF,2220,50V,X7R
- L1,L2: IND.FB,120 OHM,0805,5A
- L3: IND.5N5,1508
- R1,R10,R11: RES,SRI,0805
- R2: RES,SRI,0603
- GS1-GS26: GROUND STRAP, FOLD AS SHOWN GS CAN BE USED INSTEAD OF PLATED VIAS.

TOLERANCES UNLESS NOTED

.X	± .1	X'	± 1'
.XX	± .02	X'X'	± 0'30'
.XXX	± .005		
.XXXX	± .0002	FRACTION	± 1/32

MATERIAL: NOTED

DRAWN: W Veitschegger

CHECKED: J. BURGER

APPROVED: J. DAVIS



IGN5459M80 RF TEST FIXTURE

SIZE A	FSCM NO.	DWG NO. IGN5459M80 RF TEST FIXTURE	REV PR1
SCALE:		SHEET: 1/1	

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CONTACT FACTORY FOR RF TEST FIXTURE CAD DRAWING WITH CIRCUIT DIMENSIONS

<L:\Public\Controlled Documents\Controlled Drawings\RF Test Fixture Drawings\IGN5459M80 REV PR1.dwg>

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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