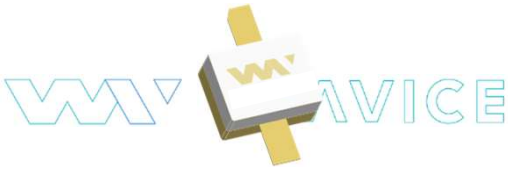
WG60002SF-LV

3.6 – 3.8 GHz 2W GaN Amplifier

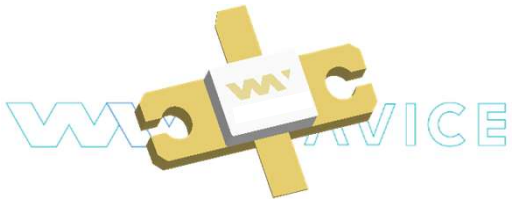
Features

- Frequency Range : 3.6 – 3.8 GHz
- Psat : 33 dBm
- Power Gain: 12 dB @Psat
- Small Signal Gain: 15 dB
- DE: 50% @Psat
- Bias : V_D = 28V, I_{DQ} = 20mA, V_G = -2.5V (Typ.)
- Characterized at Pulse duty 10%, Pulse width 100uS

Product Image



- Package Type : SCN-BC1



- Package Type : SCF-BC1

Description

Wavice's WG60002SF-LV is a high power, S-Band amplifier fabricated on Wavice's Durable 0.4um GaN on SiC process. Covering the frequency range of 3.6 to 3.8 GHz, the WG60002SF-LV typically provides 33 dBm of saturated output power and 12 dB of power gain while achieving 50% Drain efficiency.
The WG60002SF-LV is ideal for use in both commercial and military radar systems.

ROHS compliant.

Applications

- Military Radar
- Commercial Radar
- Infra Structure
- Small Cell

Ordering information

Part No.	Description
WG60002SF-LV	SCF-BC1
WG60002SP-LV	SCN-BC1
WG60002SP-LVEV	WG60002SP-LV Evaluation Board
WG60002SF-LVEV	WG60002SF-LV Evaluation Board

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Absolute Maximum Ratings

Parameter	Symbol	Value / Range
Drain Source Voltage	V_{DS}	55 V
Gate Source Voltage	V_{GS}	-10 to +2 V
Maximum Forward Gate Current	I_{GMAX}	0.7 mA
Absolute Maximum Channel Temperature	T_{CH}	+250 ℃
Storage Temperature	T_{STG}	-65 ℃ to +150 ℃
Mounting Temperature		245 ℃ / 30 sec

1) Case temperature T_C =25 ℃
2) Wavice does not recommend sustained operation above maximum operating conditions.
3) Exceeding any one or a combination of the Absolute Maximum Rating conditions may cause permanent damage to the device. Extended application of Absolute Maximum Rating conditions to the device may reduce device reliability.

Recommended Operating Conditions

Parameter	Symbol	Value / Range
Drain Source Voltage	V_{DS}	28 V
Drain Current	I_{DQ}	20 mA
Gate Source Voltage (Typical)	V_{GS}	-2.5 V
Case Operating Temperature		~40 ℃ to +85 ℃

1) Electrical specifications are measured at specified test conditions. Specifications are not guaranteed over all recommended operating conditions.
2) Proper ESD(electrostatic discharge) control techniques should be used when handling these devices.

Thermal Characteristics

Parameter	Symbol	Units	Value	Test Conditions
Thermal Resistance using Infrared Measurement of Die Surface Temperature	R_{θ}(IR)	℃/W	13.09	Tbase = 85°C, Vd = 28V, Idq = 20mA, Freq = 3.6 – 3.8 GHz
Peak IR Surface Temperature	T_{CH}	℃	92.6	

1) Thermal resistance determined to the case temperature (85 ℃)
2) Channel temperature indicated is an IR scan equivalent temperature, Thermal resistance is calculated using this value.

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Electrical Specifications

Parameter	Units	Min	Typ	Max
Saturated Output Power [1)]	dBm		33	
Drain Efficiency @Psat	%		50	
Power Gain @Psat	dB		12	
Small Signal Gain	dB		15	
Input Return Loss	dB		-7	

Test conditions, unless otherwise noted :

- T_A = 25 °C, V_D = 28V, I_{DQ} = 20mA, V_G = -2.5V(Typ.)
- Test Frequency : 3.6 – 3.8 GHz
- Measured in WG60002SF-LV Evaluation Board

1) Characterized at Pulse duty 10%, Pulse width 100uS

Parameter	Units	Min	Typ	Max	Test Conditions
Gate Threshold Voltage	V	-3.8	-2.7	-2.0	V_{DS}= 10V, I_D= 0.7 mA
Drain-Source Breakdown Voltage	V	150			V_{GS}= -8V, I_D= 0.7 mA
Drain Current(I_{DMAX})[1)]	A	0.5	0.7		V_{DS}= 10V, V_{GS}= 2.0V
Gate Forward Voltage	V		2		I_{GS}= 0.7 mA

Test conditions, unless otherwise noted :

1) Scaled from PCM unit cell

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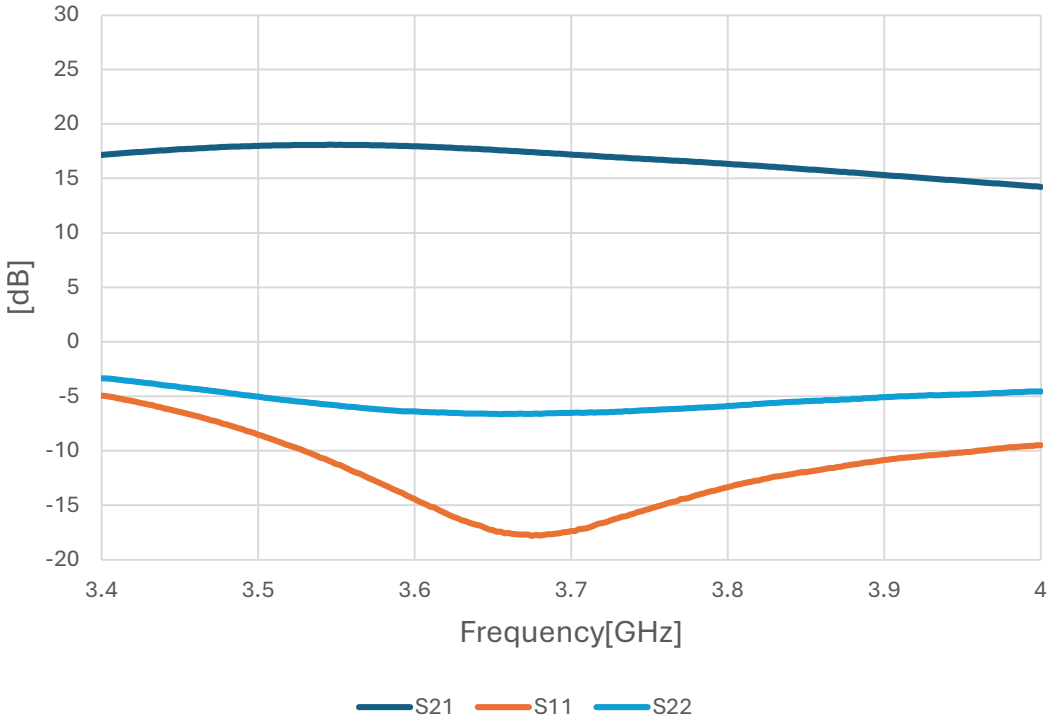
Performance Plots | S-Parameter

Test conditions, unless otherwise noted: T = +25 °C, V_D = 28 V, I_{DQ} = 20 mA



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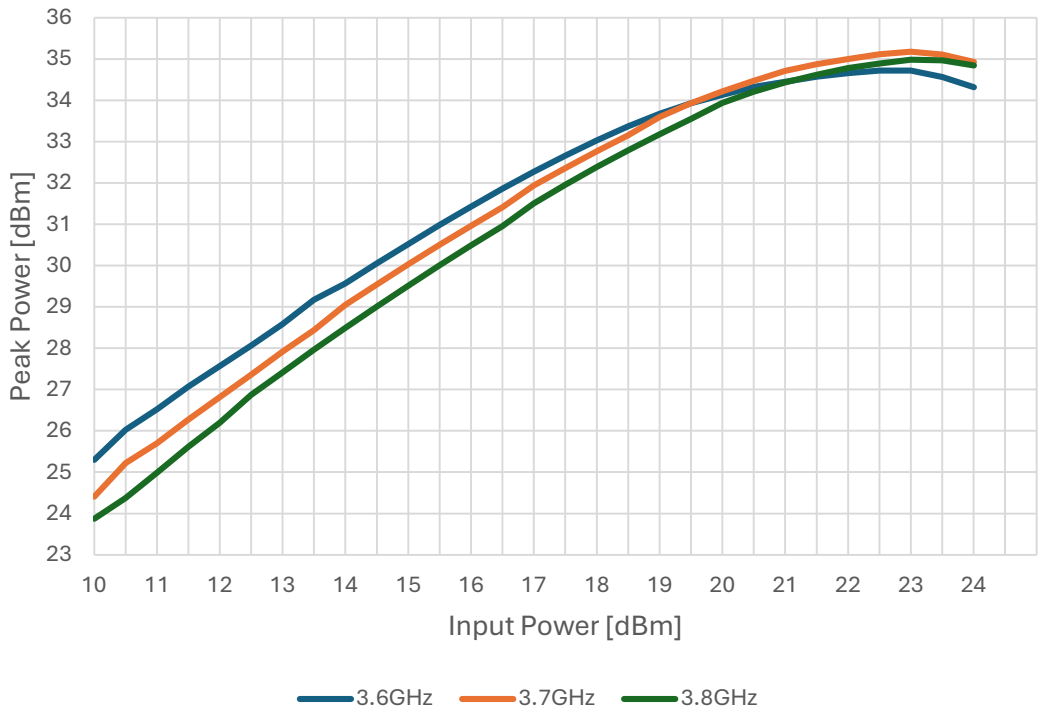
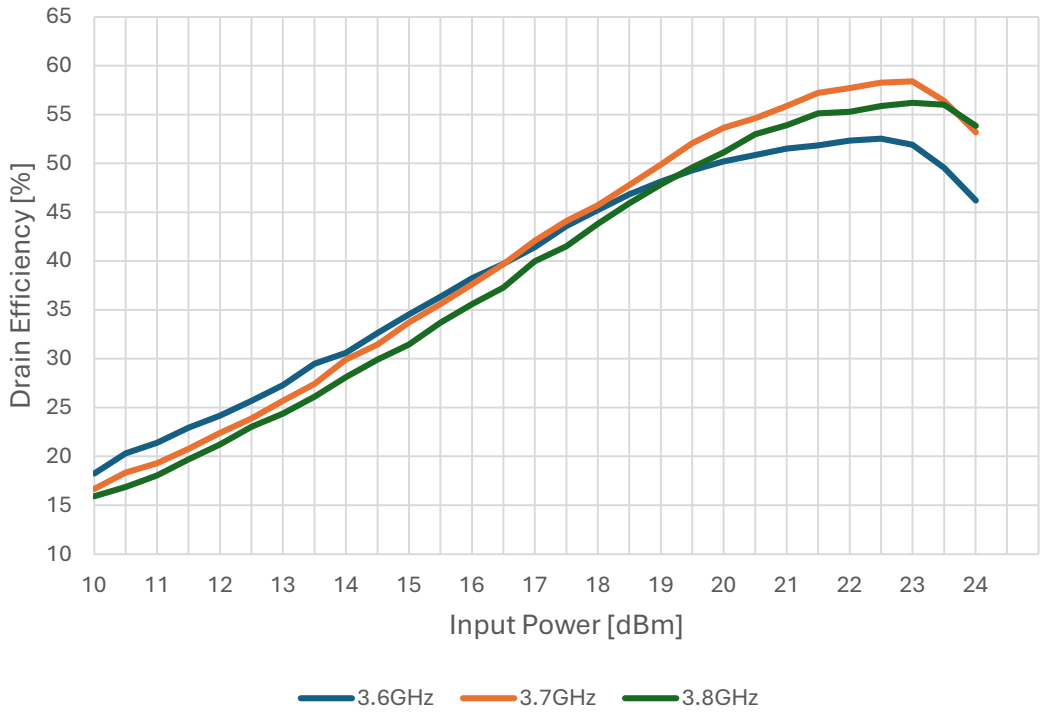
Performance Plots | Peak Power / DE vs Input Power

Test conditions, unless otherwise noted: T = +25 °C, V_D = 28 V, Pulse Width = 100usec, Duty Cycle = 10%





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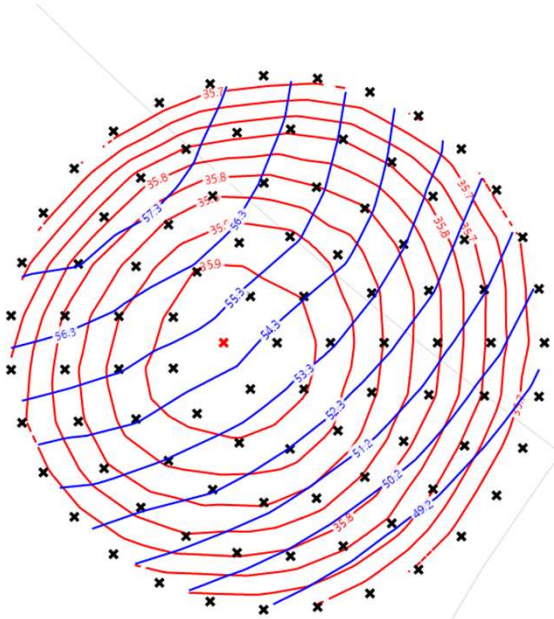
Load Pull Performance Plots | Power Matched

Test conditions, unless otherwise noted: T = +25 °C , VD = +28 V, IDQ = 20 mA, Pulse Width = 100usec, Duty Cycle = 5%

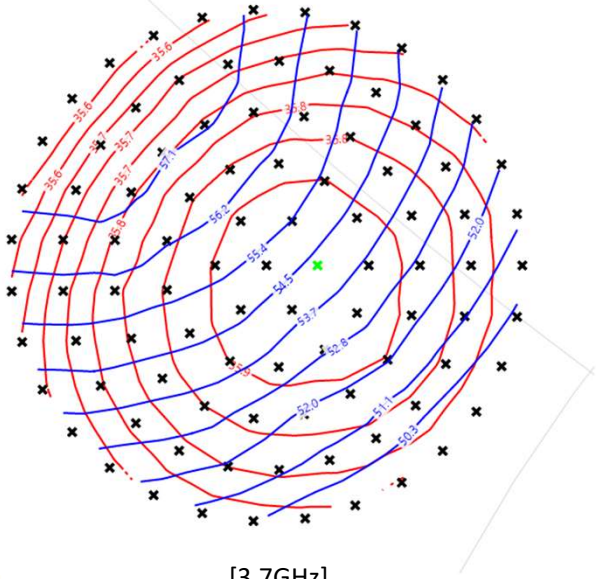
Freq (GHz)	ZL_F0	Zin_F0	Gain (dB)	Pout (dBm)	Pout (W)	Power Density (W/mm)	D.Eff(%)
3.6	17.87+22.58i	7.73-2.26i	12.42	35.90	3.89	7.79	54.84
3.7	18.70+23.21i	7.93-0.63i	12.20	35.93	3.91	7.83	54.28
3.8	17.98+21.57i	8.01+1.61i	12.10	35.77	3.77	7.55	54.40

Load Pull Contours | Power Matched

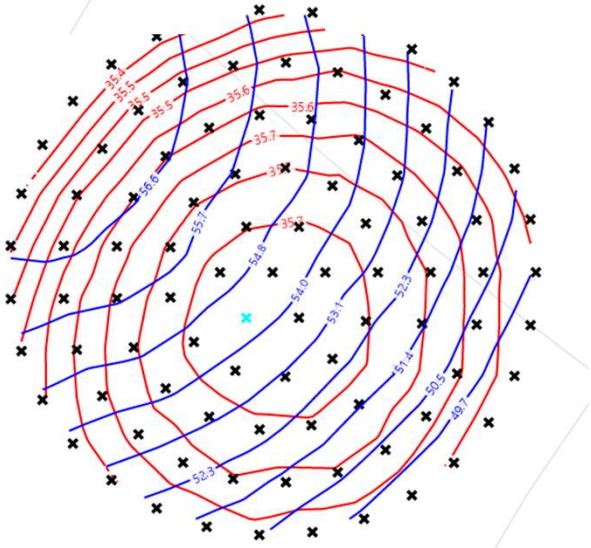
Test conditions, unless otherwise noted: T = +25 °C , VD = +28 V, IDQ = 20 mA, Pulse Width = 100usec, Duty Cycle = 5%



[3.6GHz]



[3.7GHz]



[3.8GHz]

WG60002SF-LV

3.6 – 3.8 GHz 2W GaN Amplifier

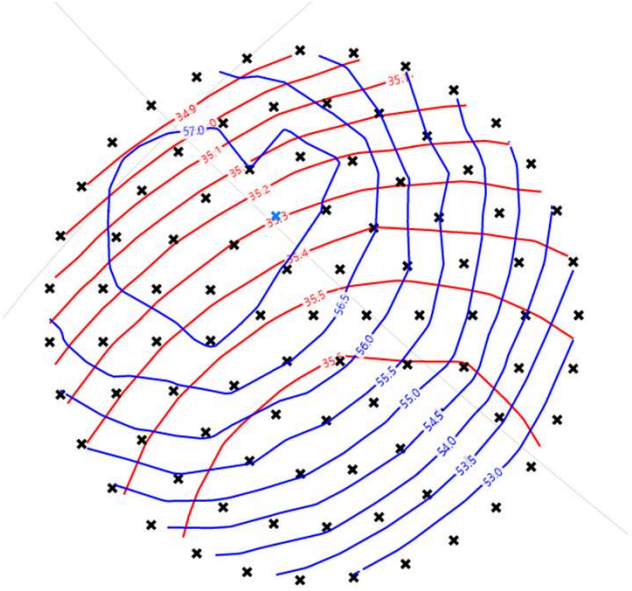
Load Pull Performance Plots | Efficiency Matched

Test conditions, unless otherwise noted: T = +25 °C , VD = +28 V, IDQ = 20 mA, Pulse Width = 100usec, Duty Cycle = 5%

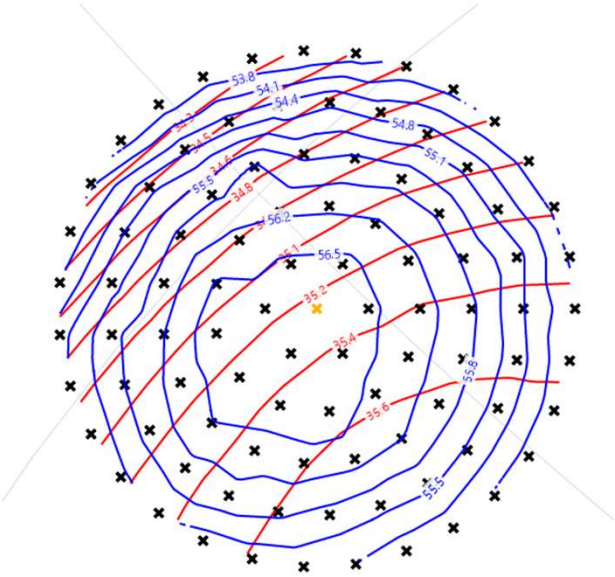
Freq (GHz)	ZL_F0	Zin_F0	Gain (dB)	Pout (dBm)	Pout (W)	Power Density (W/mm)	D.Eff(%)
3.6	12.22+25.12i	12.84+1.59i	12.84	35.32	3.40	6.81	57.38
3.7	12.04+24.28i	7.80+1.68i	12.60	35.29	3.38	6.76	56.89
3.8	12.23+23.42i	8.01+1.61i	12.44	35.19	3.31	6.61	56.49

Load Pull Contours | Efficiency Matched

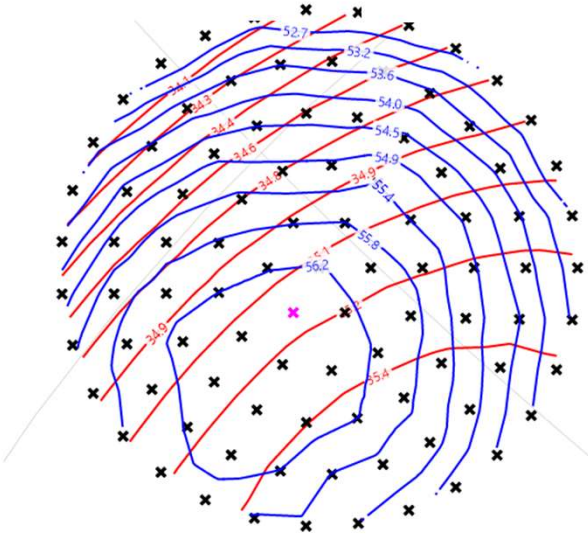
Test conditions, unless otherwise noted: T = +25 °C , VD = +28 V, IDQ = 20 mA, Pulse Width = 100usec, Duty Cycle = 5%



[3.6GHz]



[3.7GHz]



[3.8GHz]

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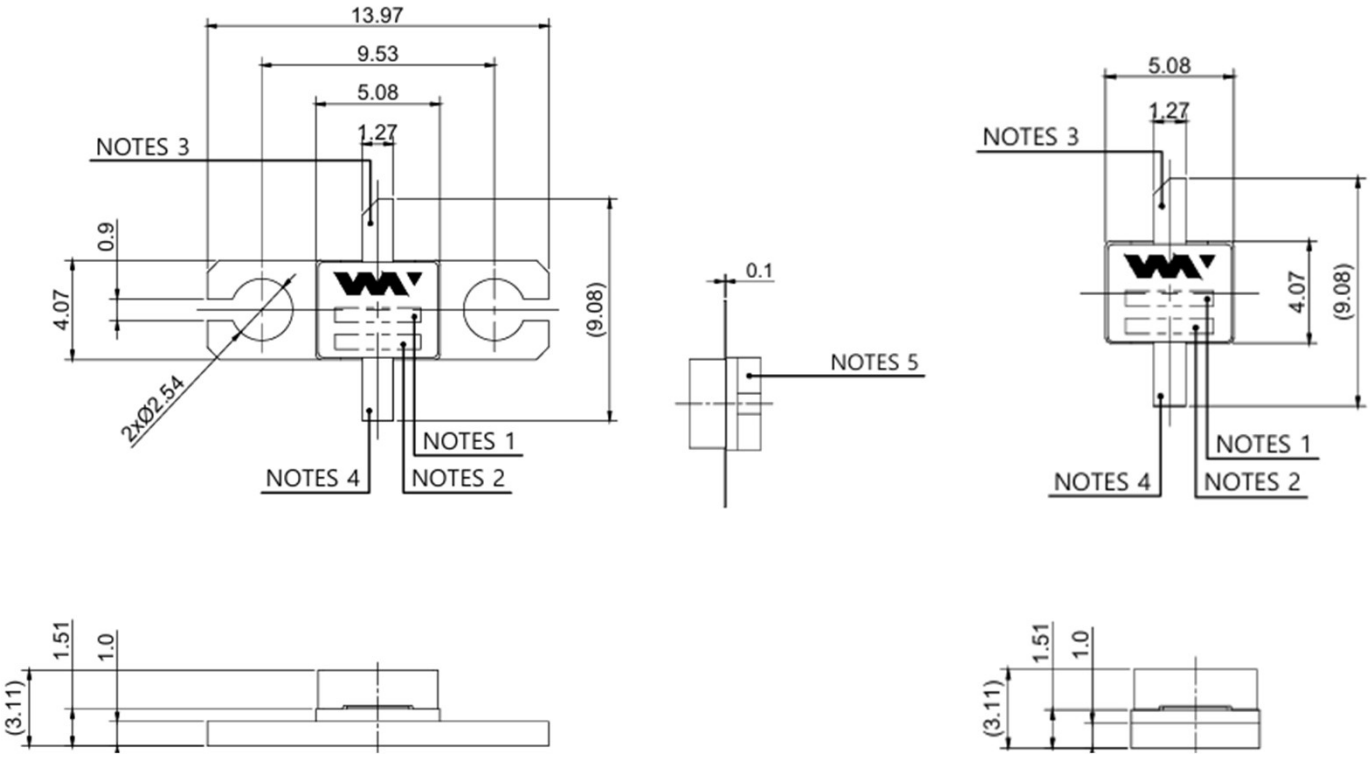
Package Dimensions

Notes:

1. All dimensions are in millimeters.
2. Dimension tolerances are ±0.20 mm for single-decimal dimensions (X.X) and ±0.15 mm for double-decimal dimensions (X.XX), unless otherwise noted.



NOTES

1. Model Name
2. Lot No / Serial No
3. Vg / RF IN
4. Vd / RF out
5. GND

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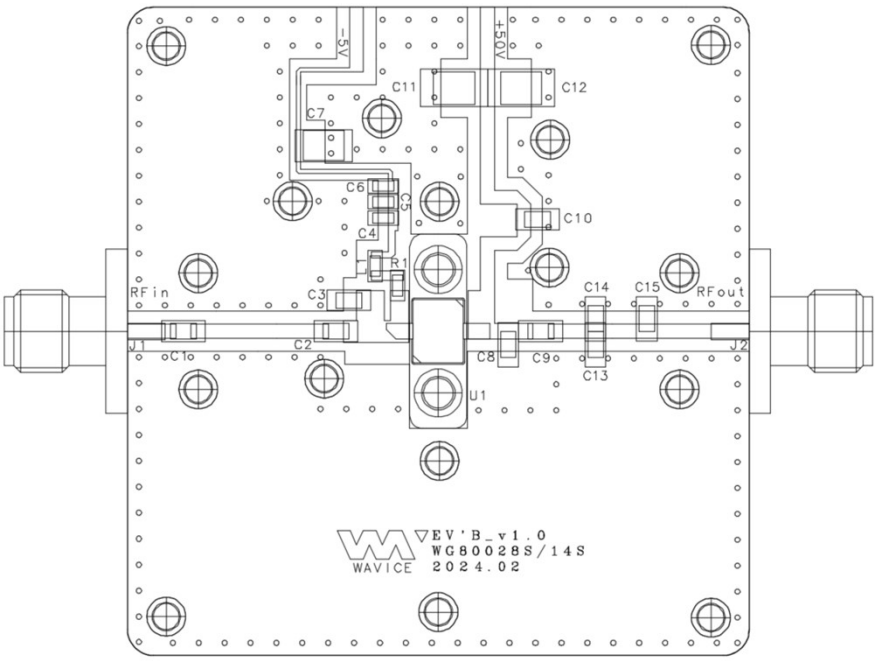
Evaluation Board

Notes:

1. Evaluation Board Size 50 X 48 [mm]



Bill of Materials

Reference Designator	Value	Description
C1	2.7pF	201 HQ CAP, 200V
C2	1pF	201 HQ CAP, 200V
C3, C8, C15	0.3pF	201 HQ CAP, 200V
C4	10pF	0603 Chip CAP, 50V
C5	1nF	0603 Chip CAP, 50V
C7	4.7uF	Tantal CAP, 16V
C9	3pF	201 HQ CAP, 200V
C10	100pF	201 HQ CAP, 200V
C12	10uF	MLCC CAP, 10uF, 100V
C13	0.7pF	201 HQ CAP, 200V
C14	0.5pF	201 HQ CAP, 200V
L1	1.5nH	0603 Chip Inductor, ±5%
R1	10 ohm	0603 Chip Res, ±5%
C6, C11	-	NC
U1	2W	Wavice GaN Transistor
PCB Information	RO4350B, 20mil, 1oz	

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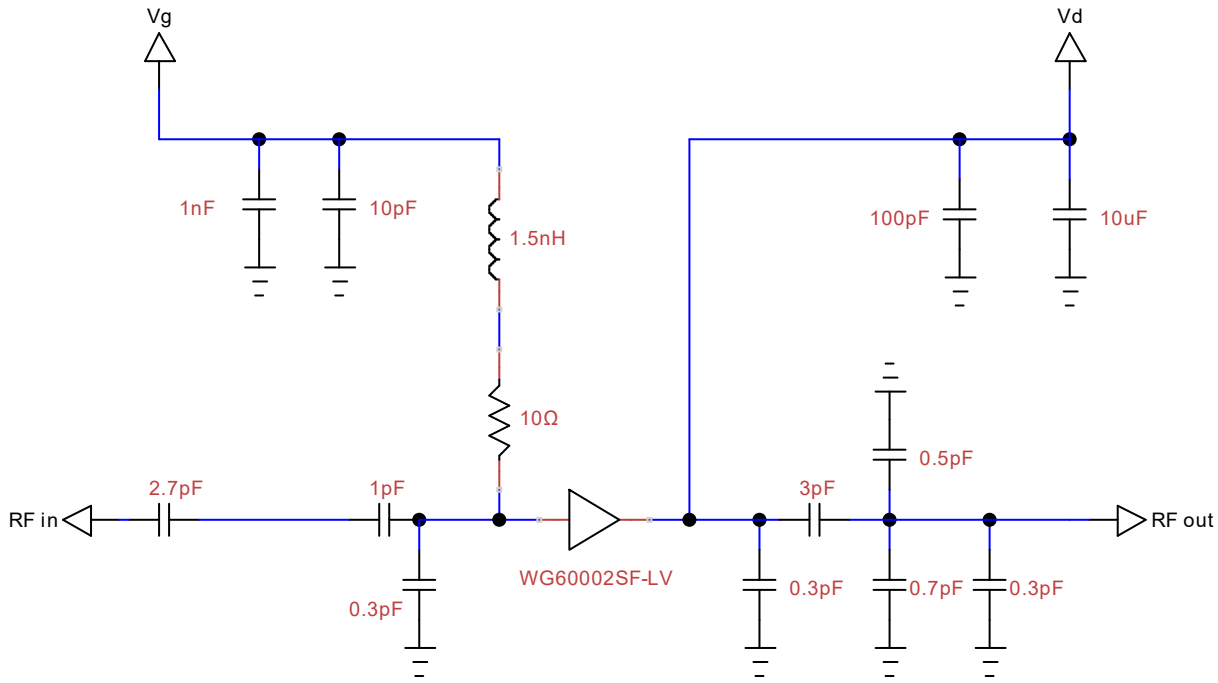
Applications Information

Notes:

1. Evaluation Board Schematic



Bias-Up & Down Procedure

Procedure	Description
Bias-Up	1. Set I_D limit to 5000 mA, I_G limit to 20 mA
	2. Set V_G to −4.0 V
	3. Set V_D +28 V
	4. Adjust V_G more positive until I_{DQ}
	5. Apply RF signal
Bias-Down	1. Turn off RF signal
	2. Reduce V_G to −4.0 V. Ensure I_{DQ} ~ 0 mA
	3. Set V_D to 0
	4. Turn off V_D supply
	5. Turn off V_G supply

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Handling Precautions

Parameter	Class	Test Methodology
ESD – Human Body Model (HBM)	Class 1B	JEDEC JESD22 A114-D
ESD – Charged Device Model (CDM)	Class IV	JEDEC JESD22 C101-C
MSL – Moisture Sensitivity Level	N/A	IPC/JEDEC Standard J-STD-020

Solderability

The component leads should be manually soldered, and the package cannot be subjected to conventional reflow processes. The use of no-clean solder to avoid washing after soldering is recommended.

Contact Information

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- Tel : +82-31-260-8600
- Email : sales@wavice.com

Notes & Disclaimer

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