

WSGPA01

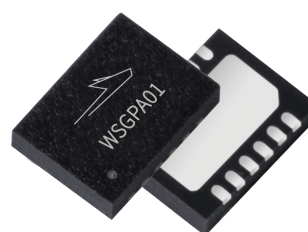
10 W, 5 GHz, GaN on SiC General Purpose Power Amplifier

Description

The WSGPA01 is a GaN on SiC Discrete General Purpose Amplifier (GPA) designed for applications up to 5 GHz. The device operates from supply voltages up to 50 V and can achieve a P_{3dB} of 10 W. It is housed in a 3 mm X 4 mm DFN package. While it is designed for communications infrastructure applications with crest factor reduced and digitally pre-distorted LTE or 5G NR signals, it may be suitable for other applications at frequencies up to 5 GHz, restricted only by its maximum operating conditions.

Features

- GaN on SiC HEMT technology
- Operating frequency : up to 5 GHz
- P_{3dB} : up to 10 W
- Supply voltage : up to 50 V
- Maximum junction temperature : 225 °C
- Pb-free and RoHS compliant



WSGPA01
Package PG-DFN-3x4-1

RF Performance

Typical Single-carrier WCDMA Performance (tested in Wolfspeed test fixture)

$V_{DD} = 48$ V, $I_{DQ} = 25$ mA, $P_{OUT} = 26.5$ dBm, channel bandwidth = 3.84 MHz, input PAR = 10 dB @ 0.01% CCDF

Frequency	P_{OUT} (dBm)	Gain (dB)	Efficiency (%)	ACPR – (dBc)	ACPR + (dBc)	PAR (dB)
3400 MHz	26.5	16.1	16.9	–47.8	–48.6	9.3
3600 MHz	26.5	16.0	15.7	–49.1	–49.9	9.4
3800 MHz	26.5	15.7	16.5	–46.9	–47.2	9.3

All published data at $T_{AMBIENT} = 25^{\circ}\text{C}$ unless otherwise indicated

RoHS
COMPLIANT

Absolute Maximum Ratings (Case Temperature $T_{CASE} = 25^{\circ}\text{C}$)

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DSS}	125	V
Gate-source Voltage	V_{GS}	-10 to +2	V
Gate Current	I_G	1.2	mA
Drain Current	I_D	12	A
Operating Voltage	V_{DD}	55	V
Junction Temperature	T_J	225	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-65 to +150	$^{\circ}\text{C}$

Operation above the maximum values listed here may cause permanent damage. Maximum ratings are absolute ratings; exceeding only one of these values may cause irreversible damage to the component. Exposure to absolute maximum rating conditions for extended periods may affect device reliability. For reliable continuous operation, the device should be operated within the operating voltage range (V_{DD}) specified above.

DC Characteristics

Characteristics	Conditions	Symbol	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{GS} = -8\text{ V}, I_D = 10\text{ mA}$	$V_{(BR)DSS}$	150	—	—	V
Drain-Source Leakage Current	$V_{GS} = -8\text{ V}, V_{DS} = 50\text{ V}$	I_{GSS}	—	—	-0.5	mA
Gate Threshold Voltage	$V_{DS} = 10\text{ V}, I_D = 1.2\text{ mA}$	$V_{GS(th)}$	-3.8	-3.1	-2.3	V

Recommended Operating Conditions

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
Drain Operating Voltage		V_{DD}	0	—	50	V
Gate Quiescent Voltage	$V_{DS} = 48\text{ V}, I_D = 25\text{ mA}$	$V_{GS(Q)}$	-3.45	-2.9	-2.45	V

Thermal Characteristics

Characteristics	Symbol	Value	Unit
Thermal Resistance ($T_{CASE} = 105^{\circ}\text{C}, P_{OUT} = 26.5\text{ dBm CW}$)	$R_{\theta JC}$	10.1	$^{\circ}\text{C/W}$

Moisture Sensitivity Level

Level	Test Standard	Package Temperature	Unit
3	IPC/JEDEC J-STD-020	260	$^{\circ}\text{C}$

ESD Characteristics

Parameter	Class	Standard
Human Body Model (HBM)	Class 1A	ANSI/ESDA/JEDEC JS-001
Charge Device Model (CDM)	Class C2b	ANSI/ESDA/JEDEC JS-002

RF Characteristics

Single-carrier WCDMA Performance (tested in Wolfspeed production test fixture)

$V_{DD} = 48\text{ V}$, $I_{DQ(MAIN)} = 25\text{ mA}$, $P_{OUT} = 26.5\text{ dBm}$, $f = 3600\text{ MHz}$, channel bandwidth = 3.84 MHz, input PAR = 10 dB @ 0.01% CCDF

Characteristics	Symbol	Min	Typ	Max	Unit
Gain	G_{ps}	14.8	16.3	—	dB
Drain Efficiency	η_D	14	18.2	—	%
Adjacent Channel Power Ratio	ACPR	—	-45.4	-41	dBc
Output PAR @ 0.01% CCDF	OPAR	8	9.1	—	dB

Ordering Information

Order Code	Description
WSGPA01-V1-R1	330 mm (13") Reel 100 pcs
WSGPA01-V1-R7	330 mm (13") Reel 750 pcs
WSGPA01-V1-R3K	330 mm (13") Reel 3,000 pcs
FXA/WSGPA01V1-19	2.496–2.690 GHz Evaluation Board
FXA/WSGPA01V1-14	3.3–3.7 GHz Evaluation Board
FXA/WSGPA01V1-15	3.4–3.8 GHz Evaluation Board
FXA/WSGPA01V1-16	3.4–3.6 GHz Evaluation Board
FXA/WSGPA01V1-17	3.6–3.8 GHz Evaluation Board
FXA/WSGPA01V1-18	3.7–3.98 GHz Evaluation Board

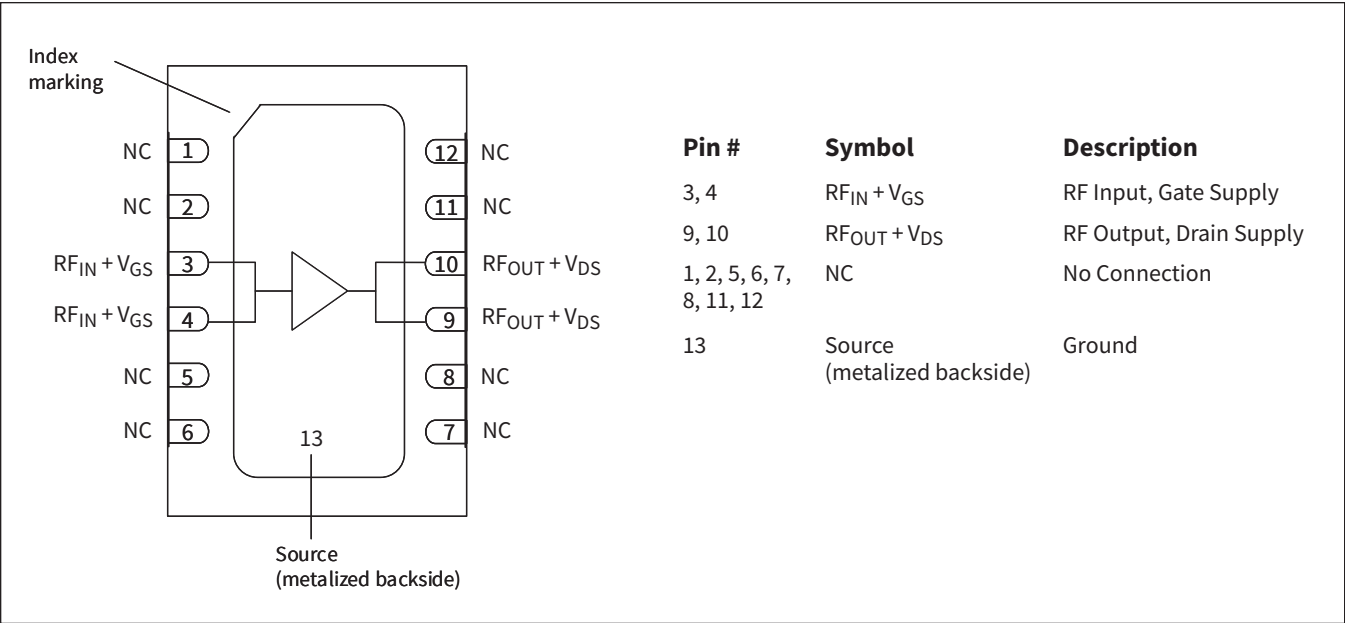
Evaluation Boards

Single-carrier WCDMA Performance (tested in Wolfspeed test fixture)

$V_{DD} = 48\text{ V}$, $I_{DQ} = 25\text{ mA}$, channel bandwidth = 3.84 MHz, input PAR = 10 dB @ 0.01% CCDF

Part Number	Frequency	Typical RF Performance					
		P_{OUT} (dBm)	Eff (%)	Gain (dB)	PAR (dB)	ACPR– (dBc)	ACPR+ (dBc)
FXA/WSGPA01V1-19	2.496–2.690 GHz	25	17.1	19.4	8.5	-36.7	-36.9
FXA/WSGPA01V1-14	3.3–3.7 GHz	26.5	18	16	8.9	-45.1	-45.8
FXA/WSGPA01V1-15	3.4–3.8 GHz	26.5	15.7	16	9.4	-49.9	-49.1
FXA/WSGPA01V1-16	3.4–3.6 GHz	26.5	19	18.2	9.2	-45.4	-44.7
FXA/WSGPA01P3-17	3.6–3.8 GHz	26.5	19.2	18.2	9.2	-44.9	-44.3
FXA/WSGPA01P3-18	3.7–3.98 GHz	26.5	17.5	16.8	9.1	-46.3	-45.2

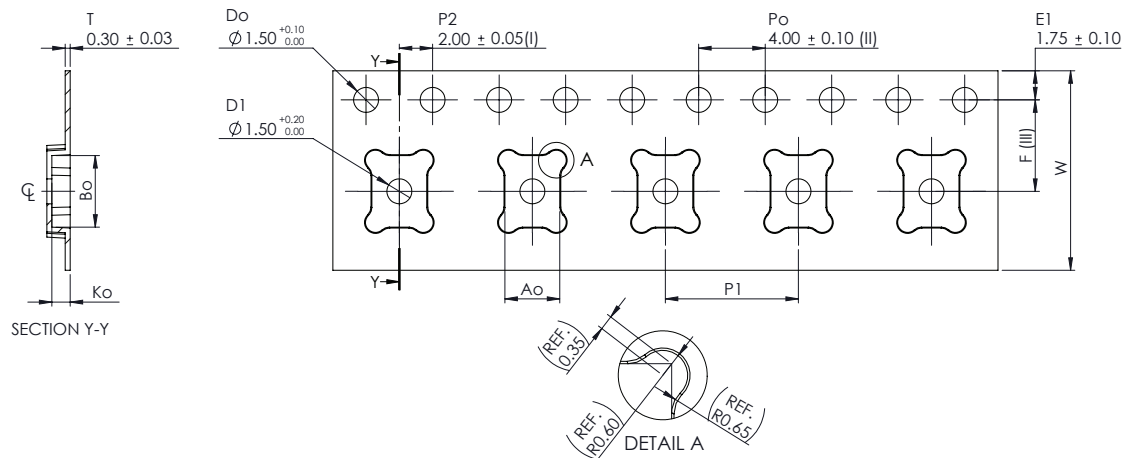
Pinout Diagram (top view)



Bias Sequencing

Bias ON	Bias OFF
1. Ensure RF is turned off	1. Turn RF off
2. Apply pinch-off voltage of -5 V to the gate	2. Apply pinch-off voltage to the gate
3. Apply nominal drain voltage	3. Turn-off drain voltage
4. Bias gate to desired quiescent drain current	4. Turn-off gate voltage
5. Apply RF	

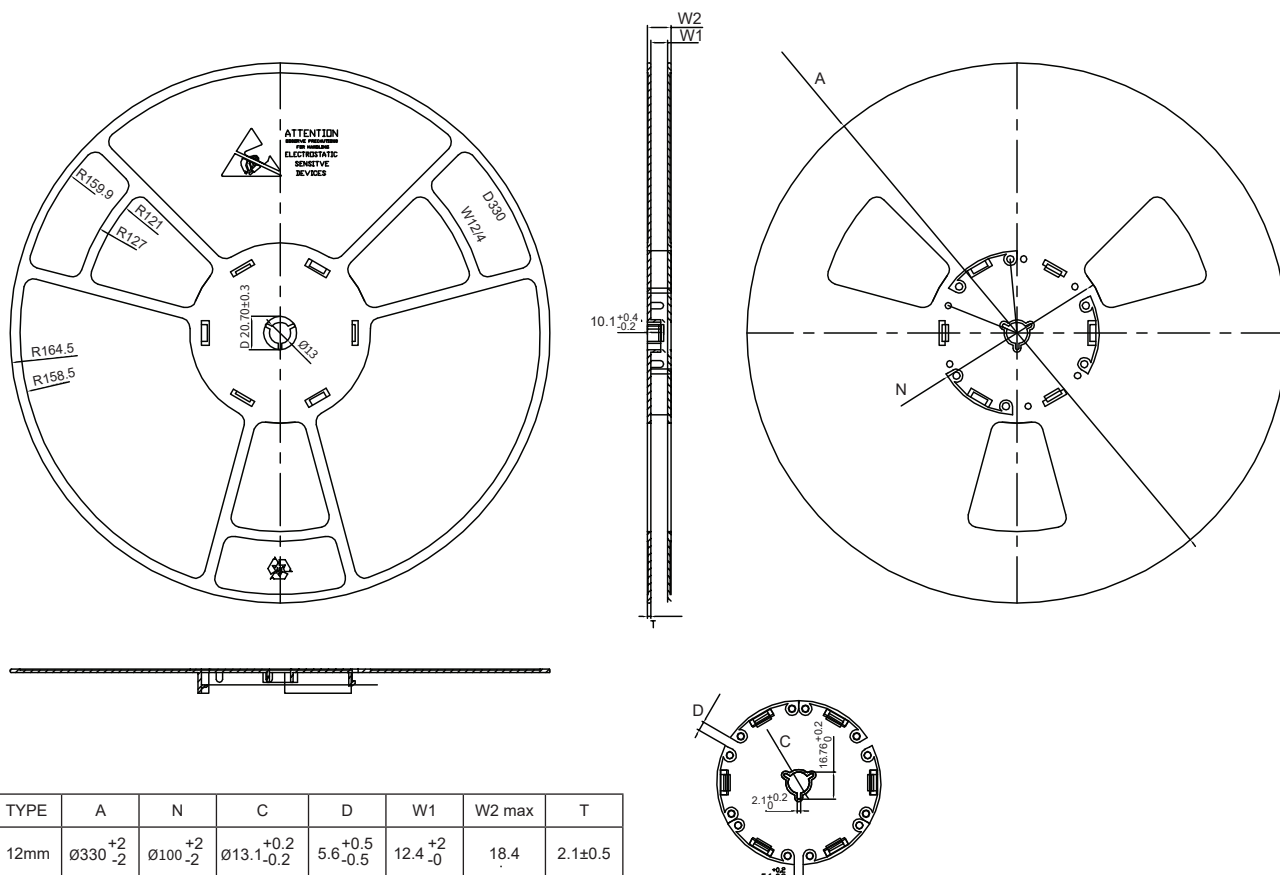
Tape and Reel Information



Ao	3.30	+/- 0.10
Bo	4.30	+/- 0.10
Ko	1.10	+/- 0.10
F	5.50	+/- 0.05
P1	8.00	+/- 0.10
W	12.00	+0.30 / -0.10

- (I) Measured from centerline of sprocket hole to centerline of pocket.
 (II) Cumulative tolerance of 10 sprocket holes is ± 0.20 .
 (III) Measured from centerline of sprocket hole to centerline of pocket.
 (IV) Other material available.
 (V) Typical SR of form tape to be $10^4 < SR < 10^{10}$ OHM.
 (VI) Dimension with () is used for design reference purposes.
 No measurement required.

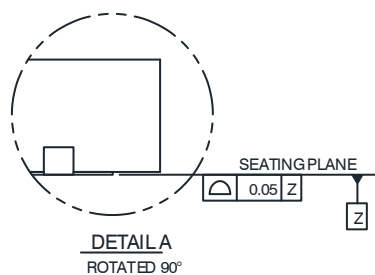
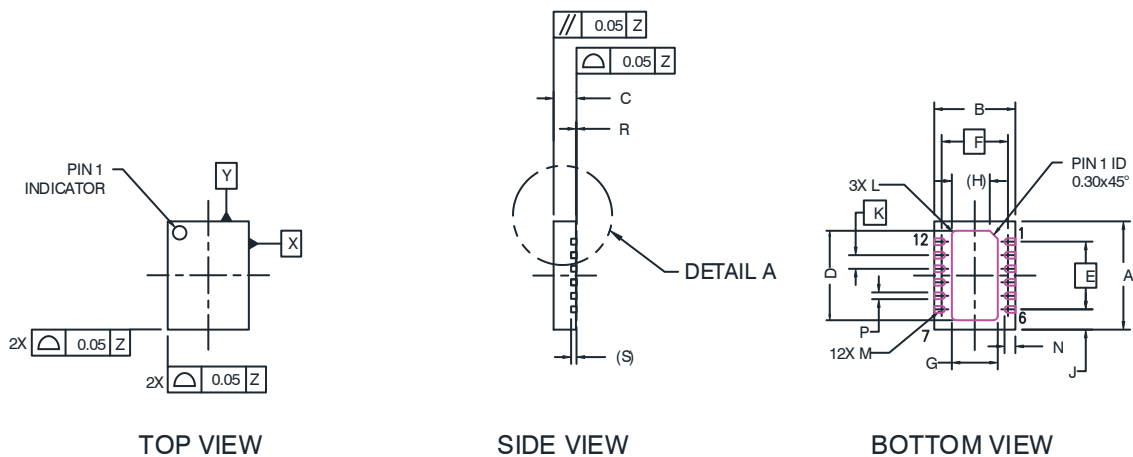
ALL DIMENSIONS IN MILLIMETERS UNLESS OTHERWISE STATED.



TYPE	A	N	C	D	W1	W2 max	T
12mm	Ø330 ⁺² / ₋₂	Ø100 ⁺² / ₋₂	Ø13.1 ^{+0.2} / _{-0.2}	5.6 ^{+0.5} / _{-0.5}	12.4 ⁺² / ₋₀	18.4	2.1 ± 0.5

Package Outline Specifications

Package PG-DFN-3x4-1



DIM	INCHES			MILLIMETERS		
	MIN	TYP	MAX	MIN	TYP	MAX
A	.156	.157	.159	3.95	4.00	4.05
B	.116	.118	.120	2.95	3.00	3.05
C	.031	.033	.035	0.80	0.85	0.90
D	.124	.130	.134	3.15	3.30	3.40
E	—	.098	—	—	2.50	—
F	—	.096	—	—	2.45	—
G	.061	.067	.071	1.55	1.70	1.80
H	—	.055	—	—	1.40	—
J	.028	.030	.032	0.70	0.75	0.81
K	—	.020	—	—	0.50	—
L	.004	.006	.008	0.10	0.15	0.20
M	.004	.005	.006	0.090	0.125	0.150
N	.012	.016	.020	0.30	0.40	0.50
P	.007	.010	.012	0.18	0.25	0.30
R	.000	.001	.002	0.00	0.02	0.05
S	—	.008	—	—	0.20	—

Diagram Notes—unless otherwise specified:

- Interpret dimensions and tolerances per ASME Y14.5M-1994.



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Notes & Disclaimer

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