Description The WST4200D is a gallium nitride (GaN) high electron mobility transistor (HEMT). GaN has superior properties compared to silicon or gallium

arsenide, including higher breakdown voltage, higher saturated electron drift velocity, and higher thermal conductivity. GaN HEMTs offer greater power density and wider bandwidths compared to Si and GaAs transistors.

#### **Ordering Information**

Part Number	MOQ Increment		
WST4200D	bulk		
WST4200D-GP4	10 pc Gel-Pak		

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# MACOM PURE CARBIDE.

### Features

- 17 dB Small Signal Gain @ 4 GHz
- 30 W P<sub>SAT</sub>
- 28 V Operation •
- High Breakdown Voltage
- **High Temperature Operation**
- Up to 6 GHz Operation
- **High Efficiency**

### **Applications**

- 2-Way Private Radio
- **Broadband Amplifiers**
- Cellular Infrastructure
- **Test Instrumentation**
- Class A, AB, Linear amplifiers suitable for OFDM, W-CDMA, EDGE, CDMA waveforms
- Radar, Electronic Warfare



## **Functional Schematic**



## Pin Configuration

Pin #	Pin Name	Function
1	$RF_{IN} / V_G$	RF Input / Gate
2	RF <sub>OUT</sub> / V <sub>D</sub>	RF Output / Drain
3	Source	Ground / Source



DC-0033511



#### WST4200D Rev. V1



## MACOM PURE CARBIDE

WST4200D

Rev. V1

#### DC Electrical Specifications @ T<sub>c</sub> = +25 °C

Parameter	Test Conditions	Symbol	Min.	Тур.	Max.	Units
Gate Threshold Voltage	$V_{DS}$ = 10 V, I <sub>D</sub> = 7.2 mA	V <sub>T</sub>	-2.6	-2.0	-1.6	V
Gate Quiescent Voltage	V <sub>DS</sub> = 28 V, I <sub>D</sub> = 100 mA	V <sub>GSQ</sub>		-1.8	—	V
Saturated Drain Current	$V_{GS}$ = 6 V, $V_{GS}$ = 2 V	I <sub>DSS</sub>	7.2	8.6	_	A
Drain-Source Breakdown Voltage	V <sub>DS</sub> = -8 V, I <sub>D</sub> = 7.2 mA	V <sub>BDS</sub>	84	_	_	V
On Resistance	V <sub>DS</sub> = 0.05 V, V <sub>GS</sub> = 0 V	R <sub>ON</sub>	0.15	0.22	_	Ω
Gate Forward Voltage	$V_{DS}$ = 0 V, I <sub>D</sub> = 7.2 µA	V <sub>G(ON)</sub>	0.4	—	—	V

#### Absolute Maximum Ratings<sup>1,2</sup>

Parameter	Absolute Maximum			
Drain-Source Voltage	84 V			
Gate Voltage	-10, +2 V			
Drain Current	3 A			
Gate Current	7 mA			
Storage Temperature	-55°C to +150°C			
Mounting Temperature	+320°C, 30 seconds			
Junction Temperature <sup>3,4</sup>	+225°C			
Operating Temperature	-40°C to +85°C			

1. Exceeding any one or combination of these limits may cause permanent damage to this device.

- 2. MACOM does not recommend sustained operation near these survivability limits.
- 3. Operating at nominal conditions with  $T_{\rm J}$   $\leq$  +225 °C will ensure MTTF > 1 x 10^6 hours.
- 4. Junction Temperature  $(T_J) = T_C + \Theta jc * (V * I)$ Typical thermal resistance  $(\Theta jc) = 2.74 \text{ °C/W}$  for CW. a) For  $T_C = +25^{\circ}C$ ,  $T_J = 105 \text{ °C} @ P_{DISS} = 29 \text{ W}$

$$I_{J} = 105 \text{ °C } @ P_{DISS} =$$

$$T_J = 165 \text{ °C } @ P_{DISS} = 29 \text{ W}$$

#### **Handling Procedures**

Please observe the following precautions to avoid damage:

#### **Static Sensitivity**

These electronic devices are sensitive to electrostatic discharge (ESD) and can be damaged by static electricity. Proper ESD control techniques should be used when handling these HBM Class 1A devices.

2



## MACOM PURE CARBIDE

## WST4200D

Rev. V1

# **CW Load-Pull Performance: Reference Plane at Device Bond Pads**

For Engineering Evaluation Only – This data does not Modify MACOM's Datasheet Limits.

		Maximum Output Power					
		$V_{DS}$ = 28 V, $I_{DQ}$ = 0.1 A, $T_{C}$ = 25°C, $P_{SAT}$					
Frequency (GHz)	Z <sub>SOURCE</sub> (Ω)	Z <sub>LOAD</sub> (Ω)	Gain (dB)	Р <sub>оит</sub> (dBm)	Р <sub>оит</sub> (W)	h <sub>D</sub> (%)	
0.5	2.8 + j9.2	6.9 + j4.7	20	48.0	63.10	78	
1	2.7 + j5.0	6.8 + j4.3	18	48.0	63.10	78	
2	2.2 + j3.2	5.7 + j4.6	14	48.0	63.10	77	
4	1.4 + j2.0	4.2 + j3.2	9.8	47.8	60.26	63	
6	0.43 + j2.4	2.4 + j2.6	7.5	47.5	56.23	60	

		Maximum Drain Efficiency					
		$V_{DS}$ = 28 V, $I_{DQ}$ = 0.1 A, $T_{C}$ = 25°C, $P_{SAT}$					
Frequency (GHz)	Z <sub>SOURCE</sub> (Ω)	Z <sub>LOAD</sub> (Ω)	Gain (dB)	Р <sub>оит</sub> (dBm)	Р <sub>оит</sub> (W)	h <sub>D</sub> (%)	
0.5	2.8 + j9.2	15.4 + j12.7	19	47	50.12	83	
1	2.7 + j5.0	8 + j 7	17	47	50.12	82	
2	2.2 + j3.2	5.2 + j6.8	13	47	50.12	81	
4	1.4 + j2.0	3 + j4.7	9	47	50.12	71	
6	0.43 + j2.4	2.9 + j3.4	7	47	50.12	64	

Impedance Reference



 $Z_{\text{SOURCE}}$  = Measured impedance presented to the input of the device at bond pad reference plane.

 $Z_{\text{LOAD}}$  = Measured impedance presented to the output of the device at bond pad reference plane.

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WST4200D

Rev. V1

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### **Die Dimensions (units in microns)**



#### **Assembly Notes:**

- Recommended solder is AuSn (80/20) solder. Refer to website for the Eutectic Die Bond Procedure application note.
- Vacuum Collet is the preferred method of pick-up.
- Die thickness is 3 mils.
- The backside of the die is the Source (ground) contact.
- Die back side gold plating is 5 microns thick minimum.
- Thermosonic ball or wedge bonding are the preferred connection methods.
- Gold wire must be used for connections.
- Use the die label (XXX-YYY) for correct orientation.

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WST4200D Rev. V1

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<sup>5</sup> 

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