

# A5G19H605W19N

## Airfast RF Power GaN Amplifier

Rev. 3.0 — 28 January 2026

Product data sheet



## 1 General description

This 85 W asymmetrical Doherty RF power GaN amplifier is designed for cellular base station applications requiring very wide instantaneous bandwidth capability covering the frequency range of 1930 MHz to 1995 MHz.

This part is characterized and performance is guaranteed for applications operating in the 1930 MHz to 1995 MHz band. There is no guarantee of performance when this part is used in applications designed outside of these frequencies.

## 2 Features and benefits

- High terminal impedances for optimal broadband performance
- Advanced high performance in-package Doherty
- Improved linearized error vector magnitude with next generation signal
- Able to withstand extremely high output VSWR and broadband operating conditions
- Plastic package

## 3 Typical performance

Table 1. 1900 MHz — Typical Doherty single-carrier W-CDMA production test fixture performance

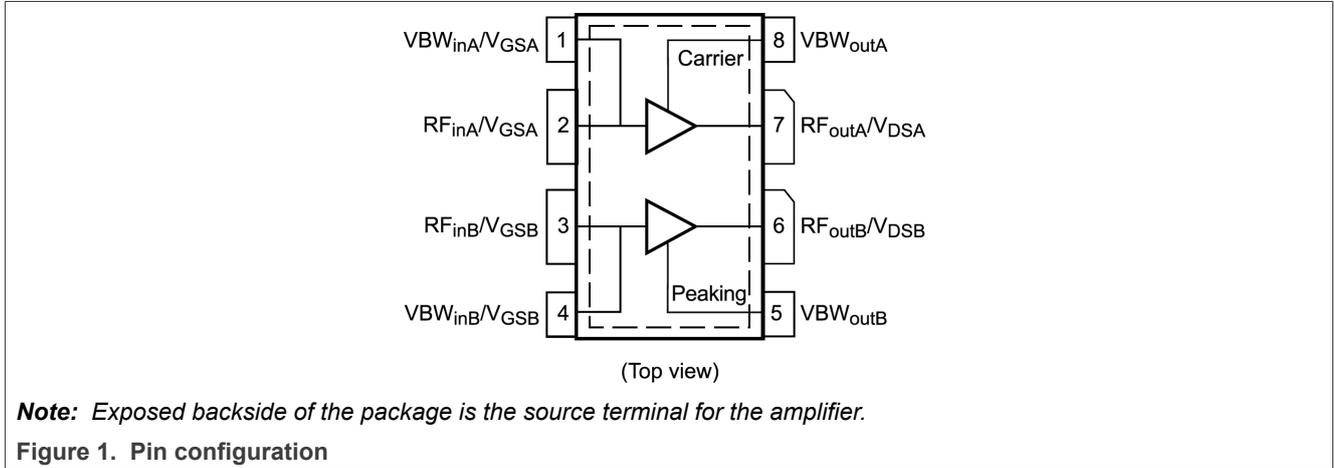
$V_{DD} = 48 \text{ Vdc}$ ,  $I_{DQA} = 300 \text{ mA}$ ,  $V_{GSB} = -5.0 \text{ Vdc}$ ,  $P_{out} = 85 \text{ W Avg.}$ , input signal PAR = 9.9 dB @ 0.01% probability on CCDF.  
[1]

| Frequency | $G_{ps}$<br>(dB) | $\eta_D$<br>(%) | Output PAR<br>(dB) | ACPR<br>(dBc) |
|-----------|------------------|-----------------|--------------------|---------------|
| 1930 MHz  | 16.3             | 54.3            | 8.9                | -29.2         |
| 1960 MHz  | 16.7             | 55.1            | 8.6                | -30.2         |
| 1995 MHz  | 17.0             | 55.7            | 8.2                | -31.2         |

[1] All data measured with device soldered to NXP production test fixture.



**4 Pinning information**



**5 Ordering information**

Table 2. Ordering information

| Device          | Tape and reel information                             | Package     |
|-----------------|---|-------------|
| A5G19H605W19NR3 | R3 suffix = 250 units, 44 mm tape width, 13-inch reel | OM-780-4S4S |

**6 Product marking**

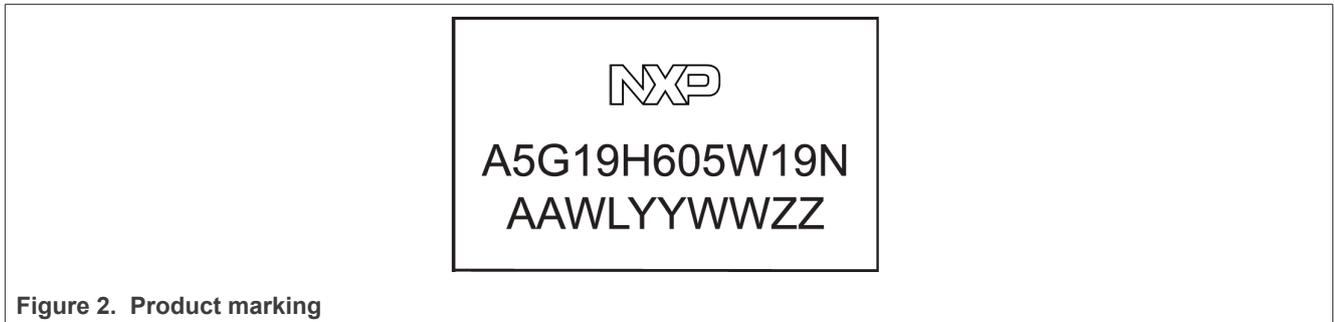


Table 3. Product marking trace code

| Identifier | Description         |
|------------|---------------------|
| AA         | Assembly location   |
| WL         | Wafer lot indicator |
| YYWW       | Date code           |
| ZZ         | Assembly lot        |

## 7 Limiting values

Table 4. Limiting values

| Rating  | Symbol     | Value       | Unit             |
|---|------------|-------------|------------------|
| Drain-source voltage  | $V_{DSS}$  | 125         | Vdc              |
| Gate-source voltage   | $V_{GS}$   | -16, 0      | Vdc              |
| Operating voltage   | $V_{DD}$   | 55          | Vdc              |
| Maximum forward gate current, $I_{G(A+B)}$ , @ $T_C = 25^\circ\text{C}$ | $I_{GMAX}$ | 95          | mA               |
| Storage temperature range   | $T_{stg}$  | -65 to +150 | $^\circ\text{C}$ |
| Case operating temperature range  | $T_C$      | -55 to +150 | $^\circ\text{C}$ |
| Maximum channel temperature   | $T_{CH}$   | 225         | $^\circ\text{C}$ |

## 8 Recommended operating conditions

Table 5. Recommended operating conditions

| Characteristic    | Symbol   | Value | Unit |
|-------------------|----------|-------|------|
| Operating voltage | $V_{DD}$ | 48    | Vdc  |

## 9 Thermal characteristics

Table 6. Thermal characteristics

| Characteristic   | Symbol                       | Value                            | Unit               |
|--|------------------------------|----------------------------------|--------------------|
| Thermal resistance by infrared measurement, active die surface-to-case (Case temperature $124^\circ\text{C}$ , $P_{D-Global} = 107\text{ W}$ )   | $R_{\theta SC}(\text{IR})$   | $0.61^{[1]}$                     | $^\circ\text{C/W}$ |
| Thermal resistance by finite element analysis, channel-to-case<br>Carrier (Case temperature $124^\circ\text{C}$ , $P_D = 75.3\text{ W}$ )<br>Peaking (Case temperature $114^\circ\text{C}$ , $P_D = 19.0\text{ W}$ ) | $R_{\theta CHC}(\text{FEA})$ | $1.3^{[1][2]}$<br>$0.9^{[1][2]}$ | $^\circ\text{C/W}$ |

[1] Refer to AN1955, *Thermal Measurement Methodology of RF Power Amplifiers*. Go to <https://www.nxp.com/RF> and search for AN1955.

[2]  $R_{\theta CHC}(\text{FEA})$  must be used for purposes related to reliability and limitations on maximum channel temperature. MTTF may be estimated by the expression  $MTTF(\text{hours}) = 10^{[A + B/(T + 273)]}$ , where T is the channel temperature in degrees Celsius, A = -11.6 and B = 9129.

## 10 ESD protection characteristics

Table 7. ESD protection characteristics

| Test methodology                      | Class |
|---------------------------------------|-------|
| Human Body Model (per JS-001-2023)    | 1C    |
| Charge Device Model (per JS-002-2022) | C3    |

## 11 Moisture sensitivity level

Table 8. Moisture sensitivity level

| Test methodology                     | Rating | Package peak temperature | Unit             |
|--------------------------------------|--------|--------------------------|------------------|
| Per JESD22-A113, IPC/JEDEC J-STD-020 | 3      | 245                      | $^\circ\text{C}$ |

## 12 Electrical characteristics

### 12.1 DC characteristics — off characteristics

**Table 9. DC characteristics — off characteristics**

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Characteristic  | Symbol      | Min | Typ | Max          | Unit |
|---|-------------|-----|-----|--------------|------|
| <b>Off characteristics<sup>[1]</sup></b>  |             |     |     |              |      |
| Off-state drain leakage<br>( $V_{DS} = 150\text{ Vdc}$ , $V_{GS} = -8\text{ Vdc}$ ) Carrier<br>( $V_{DS} = 150\text{ Vdc}$ , $V_{GS} = -8\text{ Vdc}$ ) Peaking | $I_{D(BR)}$ | —   | —   | 13.2<br>26.4 | mAdc |

[1] Each side of device measured separately.

### 12.2 DC characteristics — on characteristics

**Table 10. DC characteristics — on characteristics**

( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Characteristic   | Symbol       | Min  | Typ  | Max  | Unit |
|--|--------------|------|------|------|------|
| <b>On characteristics — Side A, Carrier</b>  |              |      |      |      |      |
| Gate threshold voltage<br>( $V_{DS} = 10\text{ Vdc}$ , $I_D = 30\text{ mAdc}$ )                                  | $V_{GS(th)}$ | -4.6 | -2.6 | -1.9 | Vdc  |
| Gate quiescent voltage<br>( $V_{DD} = 48\text{ Vdc}$ , $I_{DA} = 300\text{ mAdc}$ , measured in functional test) | $V_{GSA(Q)}$ | -3.1 | -2.6 | -2.1 | Vdc  |
| <b>On characteristics — Side B, Peaking</b>  |              |      |      |      |      |
| Gate threshold voltage<br>( $V_{DS} = 10\text{ Vdc}$ , $I_D = 60\text{ mAdc}$ )                                  | $V_{GS(th)}$ | -4.6 | -2.5 | -1.9 | Vdc  |

### 12.3 Functional tests

**Table 11. Functional tests**

(In NXP Doherty production test fixture,  $T_A = 25^\circ\text{C}$  unless otherwise noted, 50 ohm system)<sup>[1]</sup>  $V_{DD} = 48\text{ Vdc}$ ,  $I_{DQA} = 300\text{ mA}$ ,  $V_{GSB} = (V_t - 2.25)\text{ Vdc}$ ,  $P_{out} = 85\text{ W Avg.}$ ,  $f = 1960\text{ MHz}$ , single-carrier W-CDMA, IQ magnitude clipping, input signal PAR = 9.9 dB @ 0.01% probability on CCDF. ACPR measured in 3.84 MHz channel bandwidth @  $\pm 5\text{ MHz}$  offset.

| Characteristic                                | Symbol    | Min  | Typ   | Max   | Unit |
|---|-----------|------|-------|-------|------|
| Power gain                                    | $G_{ps}$  | 13.8 | 15.1  | 18.5  | dB   |
| Drain efficiency                              | $\eta_D$  | 45.0 | 53.8  | —     | %    |
| Saturated power<br>(Pulsed CW, 5% duty cycle) | $P_{sat}$ | 55.8 | 57.2  | —     | dBm  |
| Adjacent channel power ratio                  | ACPR      | —    | -31.9 | -25.7 | dBc  |

[1] Internally matched part.

**12.4 Wideband ruggedness**

**Table 12. Wideband ruggedness**

(In NXP Doherty production test fixture,  $T_A = 25^\circ\text{C}$  unless otherwise noted, 50 ohm system)  $I_{DQA} = 300\text{ mA}$ ,  $V_{GSB} = -5.0\text{ Vdc}$ ,  $f = 1960\text{ MHz}$ , Additive White Gaussian Noise (AWGN) with 10 dB PAR

| Characteristic  | Test results          |
|---|-----------------------|
| ISBW of 400 MHz at 55 Vdc, 105 W Avg. modulated output power (3 dB input overdrive from 85 W Avg. modulated output power) | No device degradation |

**12.5 Typical performance**

**Table 13. Typical performance**

(In NXP Doherty production test fixture,  $T_A = 25^\circ\text{C}$  unless otherwise noted, 50 ohm system)  $V_{DD} = 48\text{ Vdc}$ ,  $I_{DQA} = 300\text{ mA}$ ,  $V_{GSB} = -5.0\text{ Vdc}$ , 1930–1995 MHz bandwidth

| Characteristic  | Symbol                  | Min | Typ   | Max | Unit  |
|---|-------------------------|-----|-------|-----|-------|
| <b>Pulsed CW, 10% duty cycle</b>  |                         |     |       |     |       |
| Saturated power <sup>[1]</sup>  | $P_{\text{sat}}$        | —   | 624   | —   | W     |
| AM/PM <sup>[1]</sup><br>(Phase deviation from rated power to saturated power. Maximum value measured across the 1930–1995 MHz bandwidth.) | $\Phi$                  | —   | -14   | —   | °     |
| Gain variation @ Avg. power over temperature (-40°C to +85°C)   | $\Delta G$              | —   | 0.014 | —   | dB/°C |
| Output power variation @ saturated power over temperature (-40°C to +85°C)  | $\Delta P_{\text{sat}}$ | —   | 0.003 | —   | dB/°C |
| <b>Single-carrier W-CDMA, unclipped</b>   |                         |     |       |     |       |
| Gain flatness in 65 MHz bandwidth @ $P_{\text{out}} = 85\text{ W Avg.}$ <sup>[1]</sup>  | $G_F$                   | —   | 0.7   | —   | dB    |
| <b>2-tone CW</b>  |                         |     |       |     |       |
| VBW resonance point <sup>[1]</sup><br>(IMD third order intermodulation inflection point)  | $VBW_{\text{res}}$      | —   | 210   | —   | MHz   |

[1] All data measured with device soldered to NXP production test fixture.

**Correct biasing sequence for GaN depletion mode amplifiers in a Doherty configuration**

**Bias ON the device**

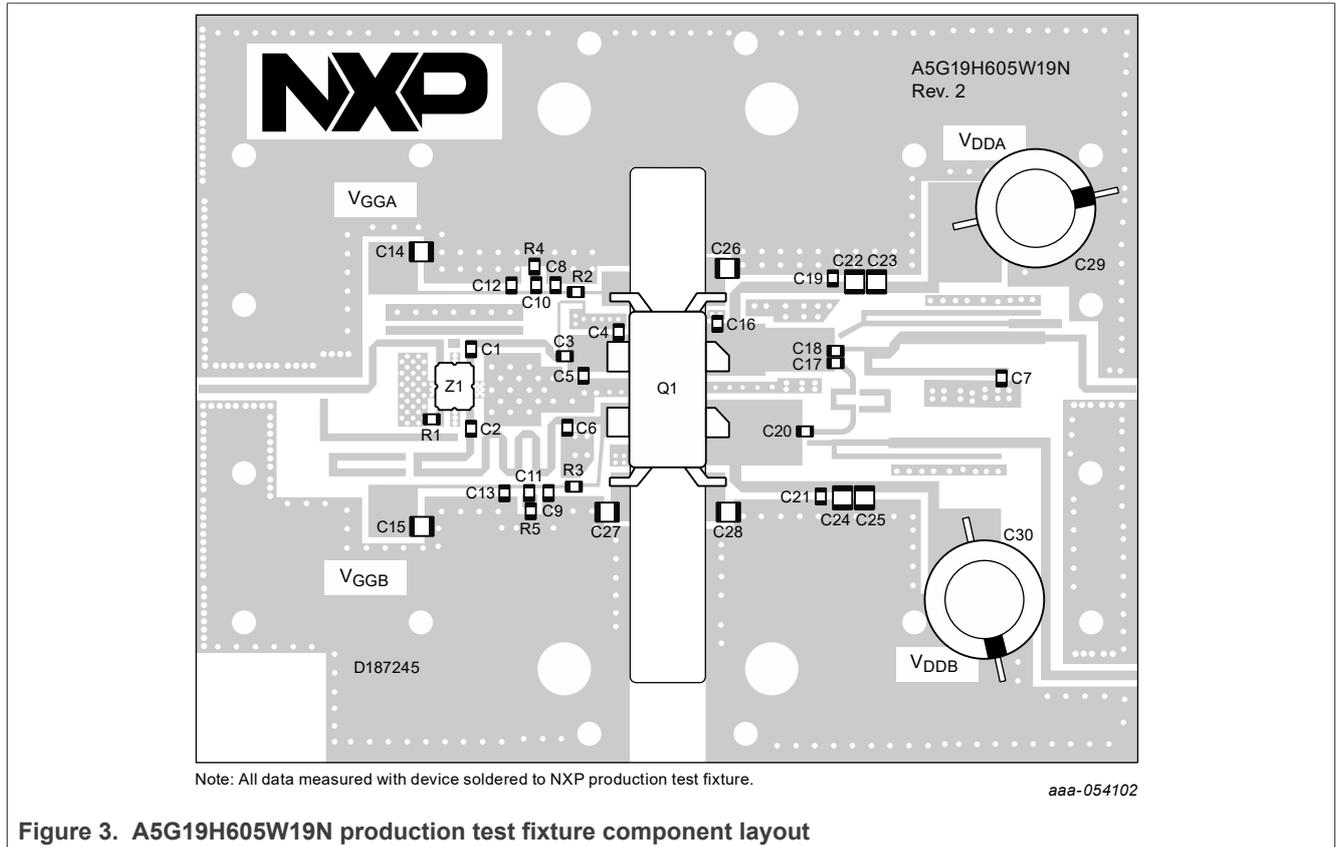
1. Set gate voltage  $V_{GSA}$  and  $V_{GSB}$  to -5 V.
2. Set drain voltage  $V_{DSA}$  and  $V_{DSB}$  to nominal supply voltage (+48 V).
3. Increase  $V_{GSA}$  (carrier side) until  $I_{DQA}$  current is attained.
4. Increase  $V_{GSB}$  (peaking side) to target bias voltage.
5. Apply RF input power to desired level.

**Bias OFF the device**

1. Disable RF input power.
2. Adjust gate voltage  $V_{GSA}$  and  $V_{GSB}$  to -5 V.
3. Adjust drain voltage  $V_{DSA}$  and  $V_{DSB}$  to 0 V. Allow adequate time for drain voltage to reduce to 0 V from external drain capacitors.
4. Disable  $V_{GSA}$  and  $V_{GSB}$ .

### 13 Component layout and parts list

#### 13.1 Component layout



**Figure 3. A5G19H605W19N production test fixture component layout**

**13.2 Component designations and values****Table 14. A5G19H605W19N production test fixture component designations and values**

| Part  | Description                                 | Part Number        | Manufacturer |
|---|---|--------------------|--------------|
| C1, C2, C3, C8, C9, C19, C20, C21           | 10 pF chip capacitor                        | GQM2195C2E100GB12D | Murata       |
| C4  | 3.3 pF chip capacitor                       | GQM2195C2E30GB12D  | Murata       |
| C5  | 1.5 pF chip capacitor                       | GQM2195C2E15GB12D  | Murata       |
| C6  | 1.2 pF chip capacitor                       | GQM2195C2E12GB12D  | Murata       |
| C7  | 3.3 pF chip capacitor                       | GQM2195C2E33GB12D  | Murata       |
| C10, C11                                    | 10 nF chip capacitor                        | C0805C103K5RACTU   | Kemet        |
| C12, C13                                    | 1 $\mu$ F chip capacitor                    | GJ821BR1H105KA12L  | Murata       |
| C14, C15, C22, C23, C24, C25, C26, C27, C28 | 4.7 $\mu$ F chip capacitor                  | C4532X7R1H475K     | TDK          |
| C16   | 0.8 pF chip capacitor                       | GQM2195C2E5GB12D   | Murata       |
| C17, C18                                    | 1 pF chip capacitor                         | GQM2195C2E1R0CB12D | Murata       |
| C29, C30                                    | 220 $\mu$ F, 100 V electrolytic capacitor   | UVY2A221MHD        | Nichicon     |
| R1  | 50 $\Omega$ , 10 W chip resistor            | C10A50Z4           | Anaren       |
| R2, R3                                      | 2.2 $\Omega$ , 1/8 W chip resistor          | CRCW08052R20JNEA   | Vishay       |
| R4, R5                                      | 1.5 $\Omega$ , 1/8 W chip resistor          | CRCW08051R50JNEA   | Vishay       |
| Q1  | RF power GaN amplifier                      | A5G26H605W19N      | NXP          |
| Z1  | 1700–2000 MHz, 90°, 3 dB hybrid coupler     | X3C19P1-03S        | Anaren       |
| PCB   | Rogers RO4350B, 0.020", $\epsilon_r = 3.66$ | D187245            | MTL          |

14 Package information

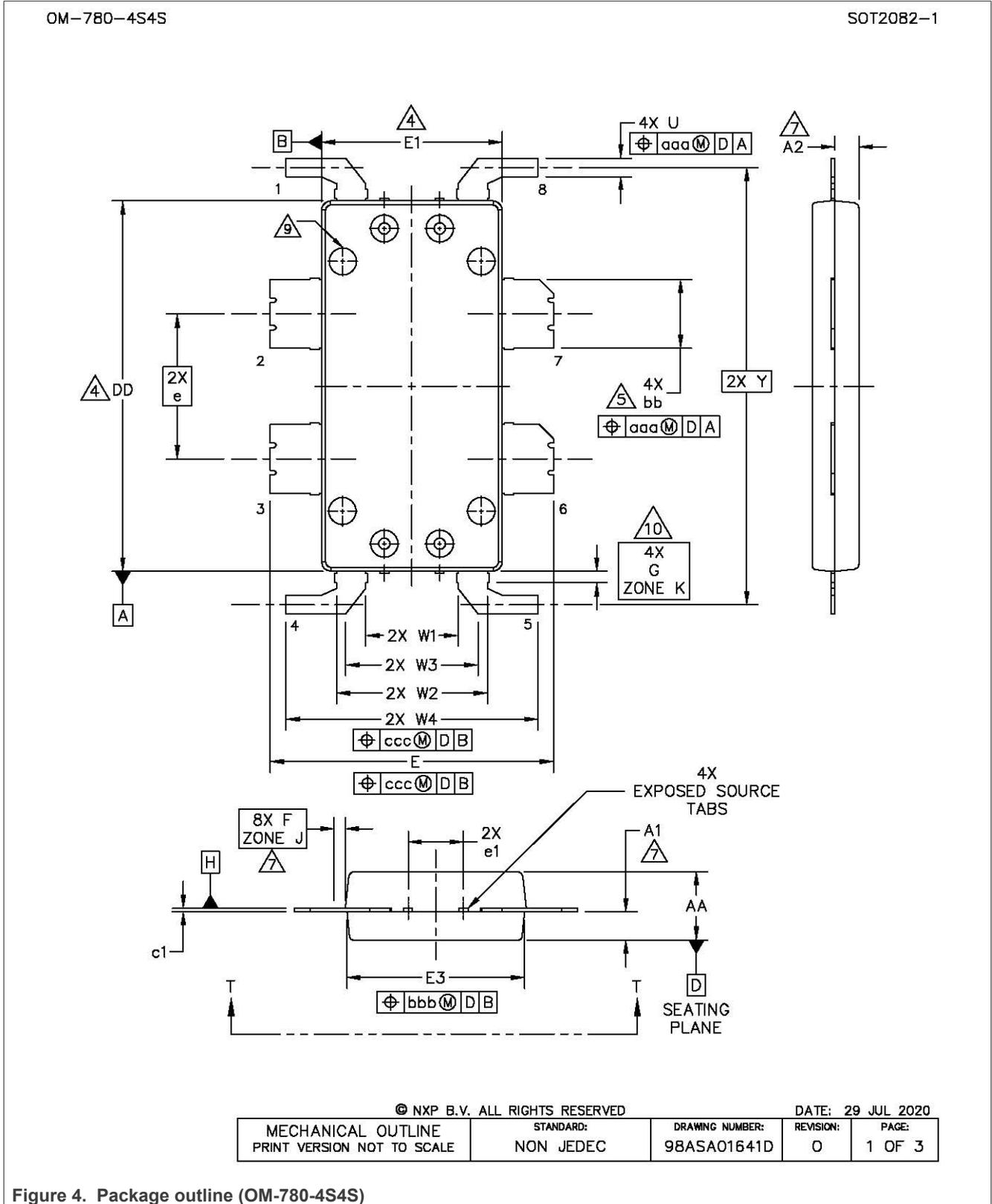
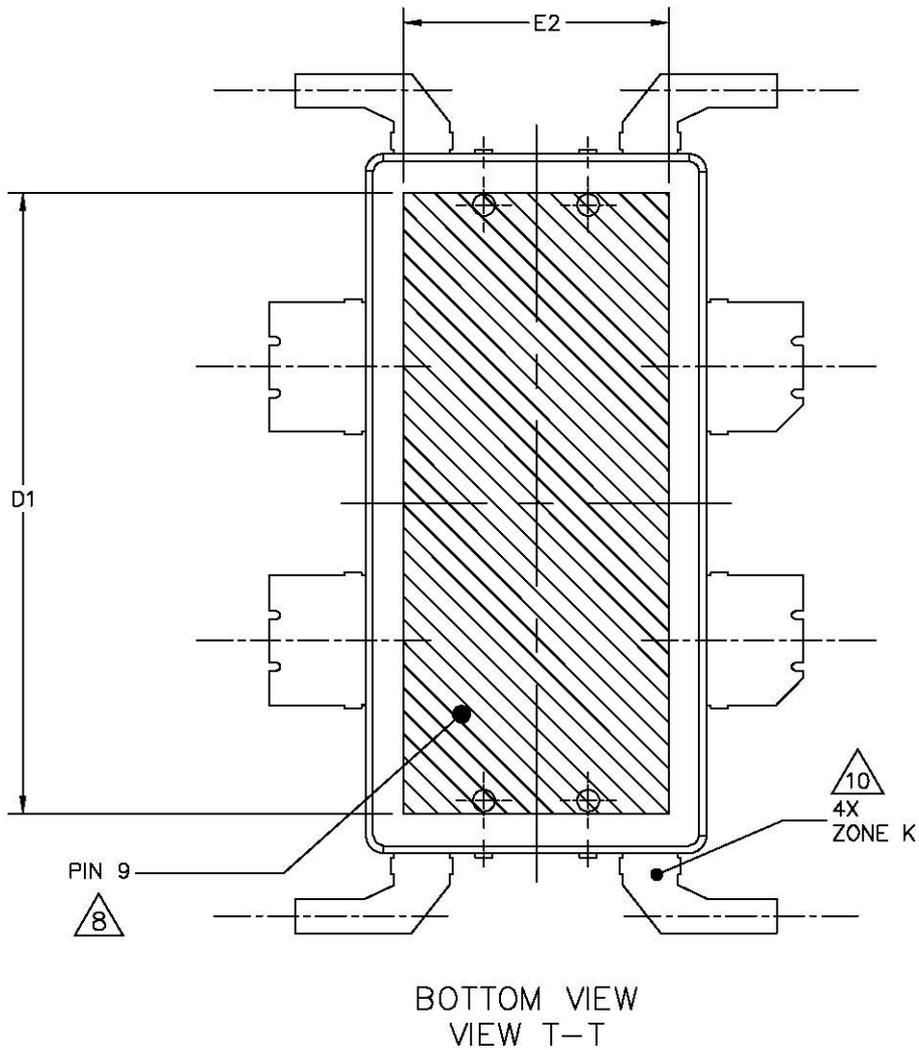


Figure 4. Package outline (OM-780-4S4S)

OM-780-4S4S

SOT2082-1



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Figure 5. Package outline (OM-780-4S4S) — bottom view

OM-780-4S4S

SOT2082-1

NOTES:

1. CONTROLLING DIMENSION: INCH
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M-1994.
3. DATUM PLANE H IS LOCATED AT TOP OF LEAD AND IS COINCIDENT WITH THE LEAD WHERE THE LEAD EXITS THE PLASTIC BODY AT THE TOP OF THE PARTING LINE.
4. DIMENSIONS DD AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS .006 INCH (0.15 MM) PER SIDE. DIMENSIONS DD AND E1 DO INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE H.
5. DIMENSION bb DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE .005 INCH (0.13 MM) TOTAL IN EXCESS OF THE bb DIMENSION AT MAXIMUM MATERIAL CONDITION.
6. DATUMS A AND B TO BE DETERMINED AT DATUM PLANE H.
7. DIMENSIONS A1 AND A2 APPLIES WITHIN ZONE J ONLY. A1 APPLIES TO PINS 2, 3, 6 AND 7. A2 APPLIES TO PINS 1, 4, 5 AND 8.
8. HATCHING REPRESENTS THE EXPOSED AREA OF THE HEAT SLUG. THE DIMENSIONS D1 AND E2 REPRESENT THE VALUES BETWEEN THE TWO OPPOSITE POINTS ALONG THE EDGES OF EXPOSED AREA OF HEAT SLUG.
9. DIMPLED HOLE REPRESENTS INPUT SIDE.
10. ZONE K REPRESENTS NON-SOLDERABLE REGION WHERE MOLD FLASH AND RESIN BLEED ARE PERMITTED ON BOTH SIDES OF THE LEADS.

| DIM | INCH     |      | MILLIMETER |       | DIM | INCH     |      | MILLIMETER |       |
|-----|----------|------|------------|-------|-----|----------|------|------------|-------|
|     | MIN      | MAX  | MIN        | MAX   |     | MIN      | MAX  | MIN        | MAX   |
| AA  | .148     | .152 | 3.76       | 3.86  | W2  | .321     | .331 | 8.15       | 8.41  |
| A1  | .059     | .065 | 1.50       | 1.65  | W3  | .281     | .291 | 7.14       | 7.39  |
| A2  | .056     | .068 | 1.42       | 1.73  | W4  | .538     | .554 | 13.67      | 14.07 |
| DD  | .808     | .812 | 20.52      | 20.62 | U   | .037     | .043 | 0.94       | 1.09  |
| D1  | .720     | ---- | 18.29      | ----  | Y   | .956 BSC |      | 24.28 BSC  |       |
| E   | .610     | .618 | 15.49      | 15.70 | bb  | .147     | .153 | 3.73       | 3.89  |
| E1  | .390     | .394 | 9.91       | 10.01 | c1  | .007     | .011 | 0.18       | 0.28  |
| E2  | .306     | ---- | 7.77       | ----  | e   | .317 BSC |      | 8.05 BSC   |       |
| E3  | .383     | .387 | 9.73       | 9.83  | e1  | .116     | .124 | 2.95       | 3.15  |
| F   | .025 BSC |      | 0.64 BSC   |       | aaa | .004     |      | 0.10       |       |
| G   | .030 BSC |      | 0.76 BSC   |       | bbb | .006     |      | 0.15       |       |
| W1  | .195     | .205 | 4.95       | 5.21  | ccc | .010     |      | 0.25       |       |

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|--|------------------------|--------------------------------|----------------|------------|

Figure 6. Package outline (OM-780-4S4S) — notes, dimensions

## 15 Product documentation, software and tools

Refer to the following resources to aid your design process.

### Application notes

- AN1907: Solder Reflow Attach Method for High Power RF Devices in Plastic Packages
- AN1955: Thermal Measurement Methodology of RF Power Amplifiers

### Software

- .s2p file

### Development tools

- Printed circuit boards

## 16 Revision history

The following table summarizes revisions to this document.

Table 15. Revision history

| Document ID         | Release date    | Description  |
|---------------------|-----------------|--|
| A5G19H605W19N v.3.0 | 28 January 2026 | • Changed reference of "Transistor" to "Amplifier"   |
| A5G19H605W19N v.2   | 30 May 2025     | • Fig. 2, Product marking: updated, p. 2<br>• Table 3, Product marking trace code: updated, p. 2 |
| A5G19H605W19N v.1   | 20 March 2024   | • Initial release of product data sheet  |

Legal information

Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | Definition  |
|-----------------------------------|-------------------------------|---|
| Objective [short] data sheet      | Development                   | This document contains data from the objective specification for product development. |
| Preliminary [short] data sheet    | Qualification                 | This document contains data from the preliminary specification.                       |
| Product [short] data sheet        | Production                    | This document contains the product specification.                                     |

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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