# BLM9H0610S-60PG

## LDMOS 2-stage power MMIC

AMPLEON

Rev. 2 — 22 April 2022

Product data sheet

# 1. Product profile

## 1.1 General description

The BLM9H0610S-60PG is a dual section, 2-stage power MMIC using Ampleon's state of the art GEN9 HV LDMMIC technology. This multiband device is perfectly suited as general purpose driver or small cell final in the frequency range from 600 MHz to 1000 MHz. Available in gull wing outline.

**Table 1. Performance**

*Typical RF performance at $T_{case}$ = 25 °C.*
*Test signal: 3GPP test model 1; 64 DPCH; PAR = 9.9 dB at 0.01 % probability on CCDF; specified in a quadrature combined class-AB demo circuit.*

| Test signal | f | $V_{DS}$ | $P_{L(AV)}$ | $G_p$ | $\eta_D$ | $ACPR_{5M}$ |
|---|---|---|---|---|---|---|
| | (MHz) | (V) | (W) | (dB) | (%) | (dBc) |
| single carrier W-CDMA | 853 | 48 | 2.5 | 35.5 | 12 | –45 |

## 1.2 Features and benefits

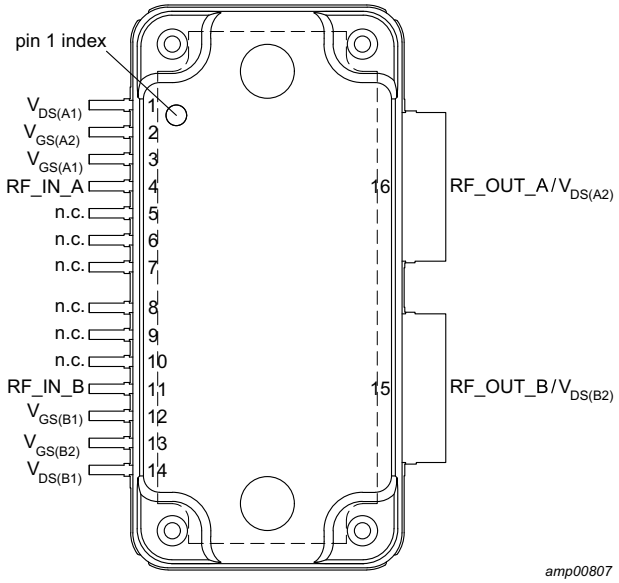
- Designed for broadband operation (frequency 600 MHz to 1000 MHz)
- High section-to-section isolation enabling multiple combinations
- Biasing of individual stages is externally accessible
- Integrated ESD protection
- Excellent thermal stability
- High power gain
- On-chip matching for ease of use
- For RoHS compliance see the product details on the Ampleon website

## 1.3 Applications

- RF power MMIC for W-CDMA base stations in the 600 MHz to 1000 MHz frequency range. Possible circuit topologies are the following as also depicted in Section 8.1:
  - Dual section or single ended
  - Doherty
  - Quadrature combined
  - Push-pull

# 2. Pinning information

## 2.1 Pinning




Transparent top view

The exposed backside of the package is the ground terminal of the device.

**Fig 1. Pin configuration**

## 2.2 Pin description

**Table 2. Pin description**

| Symbol | Pin | Description |
|---|---|---|
| $V_{DS(A1)}$ | 1 | drain-source voltage of section A, driver stage (A1) |
| $V_{GS(A2)}$ | 2 | gate-source voltage of section A, final stage (A2) |
| $V_{GS(A1)}$ | 3 | gate-source voltage of section A, driver stage (A1) |
| RF_IN_A | 4 | RF input section A |
| n.c. | 5 | not connected |
| n.c. | 6 | not connected |
| n.c. | 7 | not connected |
| n.c. | 8 | not connected |
| n.c. | 9 | not connected |
| n.c. | 10 | not connected |
| RF_IN_B | 11 | RF input section B |
| $V_{GS(B1)}$ | 12 | gate-source voltage of section B, driver stage (B1) |
| $V_{GS(B2)}$ | 13 | gate-source voltage of section B, final stage (B2) |
| $V_{DS(B1)}$ | 14 | drain-source voltage of section B, driver stage (B1) |

**Table 2. Pin description** *…continued*

| Symbol | Pin | Description |
|---|---|---|
| RF_OUT_B/$V_{DS(B2)}$ | 15 | RF output section B / drain-source voltage of section B, final stage (B2) |
| RF_OUT_A/$V_{DS(A2)}$ | 16 | RF output section A / drain-source voltage of section A, final stage (A2) |
| GND | flange | RF ground |

## 3. Ordering information

**Table 3. Ordering information**

| Type number | Package | | |
|---|---|---|---|
| | Name | Description | Version |
| BLM9H0610S-60PG | | plastic, heatsink small outline package; 16 leads | OMP-780-16G-1 |

## 4. Block diagram

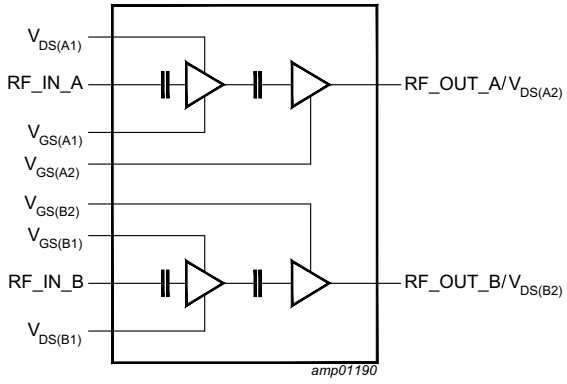



**Fig 2. Block diagram**

## 5. Limiting values

**Table 4. Limiting values**

*In accordance with the Absolute Maximum Rating System (IEC 60134).*

| Symbol | Parameter | Conditions | Min | Max | Unit |
|---|---|---|---|---|---|
| $V_{DS}$ | drain-source voltage | | - | 108 | V |
| $V_{GS}$ | gate-source voltage | | –6 | +13 | V |
| $T_{stg}$ | storage temperature | | –65 | +150 | °C |
| $T_j$ | junction temperature | [1] | - | 225 | °C |
| $T_{case}$ | case temperature | | - | 125 | °C |

[1] Continuous use at maximum temperature will affect the reliability. For details refer to the online MTF calculator.

# 6. Thermal characteristics

**Table 5. Thermal characteristics**
*Measured per section of device.*

| Symbol | Parameter | Conditions | Value | Unit |
|---|---|---|---|---|
| $R_{th(j-c)}$ | thermal resistance from junction to case | final stage; $T_{case}$ = 80 °C; $P_L$ = 1.25 W [1] | 3.50 | K/W |

[1] When operated with a CW signal.

# 7. Characteristics

**Table 6. DC characteristics**
*$T_{case}$ = 25 °C; per section unless otherwise specified.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Final stage** | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS}$ = 0 V; $I_D$ = 256 µA | 108 | - | - | V |
| $V_{GSq}$ | gate-source quiescent voltage | $V_{DS}$ = 48 V; $I_D$ = 125 mA | 1.55 | 2.16 | 2.55 | V |
| $I_{DSS}$ | drain leakage current | $V_{GS}$ = 0 V; $V_{DS}$ = 48 V | - | - | 1.4 | µA |
| $I_{DSX}$ | drain cut-off current | $V_{GS}$ = 5.8 V; $V_{DS}$ = 10 V | - | 4.1 | - | A |
| $I_{GSS}$ | gate leakage current | $V_{GS}$ = 1.0 V; $V_{DS}$ = 0 V | - | - | 140 | nA |
| **Driver stage** | | | | | | |
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS}$ = 0 V; $I_D$ = 51 µA | 108 | - | - | V |
| $V_{GSq}$ | gate-source quiescent voltage | $V_{DS}$ = 48 V; $I_D$ = 25 mA | 1.55 | 2.16 | 2.55 | V |
| $I_{DSS}$ | drain leakage current | $V_{GS}$ = 0 V; $V_{DS}$ =48 V | - | - | 1.4 | µA |
| $I_{GSS}$ | gate leakage current | $V_{GS}$ = 1.0 V; $V_{DS}$ = 0 V | - | - | 140 | nA |

**Table 7. RF Characteristics**
*Test signal: pulsed CW: $t_p$ = 455 µs; $\delta$ = 8.65 %; RF performance at $V_{DS}$ = 48 V; $I_{Dq1}$ = 25 mA (driver stage); $I_{Dq2}$ = 125 mA (final stage); $T_{case}$ = 25 °C; $P_{L(AV)}$ = 1.25 W; per section unless otherwise specified in a production circuit.*

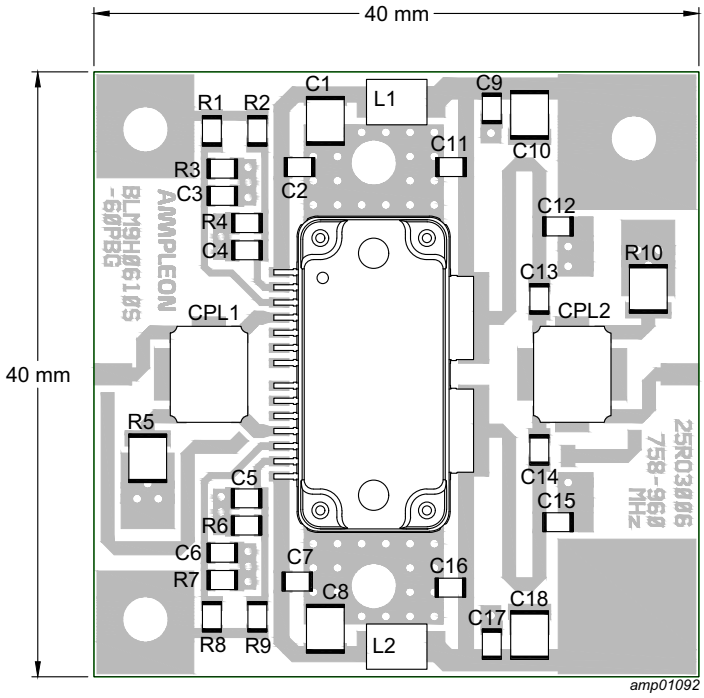
| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $G_p$ | power gain | f = 957.5 MHz | 34 | 35.5 | - | dB |
| $\eta_D$ | drain efficiency | f = 957.5 MHz | 8 | 11 | - | % |
| $RL_{in}$ | input return loss | f = 957.5 MHz | - | –18 | –11 | dB |
| $P_{L(1dB)}$ | output power at 1 dB gain compression | | 44.6 | 45.3 | - | dBm |

# 8. Application information

**Table 8. Typical performance**

*Test signal: 1-tone pulsed CW; RF performance at $T_{case}$ = 25 °C; $V_{DS}$ = 48 V; $I_{Dq1}$ = 25 mA (driver); $I_{Dq2}$ = 125 mA (final); per section; measured in a quadrature combined application circuit operating in the 758 MHz to 960 MHz band.*

| Symbol | Parameter | Conditions | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| $P_{L(1dB)}$ | output power at 1 dB gain compression | f = 800 MHz | - | 61.4 | - | W |
| $\eta_D$ | drain efficiency | at $P_{L(1dB)}$; f = 800 MHz | - | 69.1 | - | % |
| $G_p$ | power gain | $P_{L(AV)}$ = 2.5 W; f = 800 MHz | - | 38.1 | - | dB |
| $B_{video}$ | video bandwidth | 2-tone CW; $P_{L(AV)}$ = 2.5 W; f = 853 MHz | - | 150.0 | - | MHz |
| $G_{flat}$ | gain flatness | $P_{L(AV)}$ = 2.5 W; f = 758 MHz to 960 MHz | - | 1.6 | - | dB |
| $\|s12\|^2$ | isolation | between section A and section B; f = 800 MHz | - | 29.0 | - | dB |
| K | Rollett stability factor | $T_{case}$ = 25 °C; f = 0.6 GHz to 1.0 GHz | - | >1.6 | - | |




Printed-Circuit Board (PCB): Rogers 3006; thickness = 0.635 mm. See Table 9 for a list of components.

**Fig 3. Quadrature combined class-AB application circuit**

**Table 9. List of components**

*See Figure 3 for component layout.*

| Component | Description | Value | Remarks |
|---|---|---|---|
| C1, C8, C10, C18 | multilayer ceramic chip capacitor | 4.7 μF, 50 V | Murata: GRM32ER71H475KA88L, SMD 1210 |
| C2, C3, C4, C5, C6, C7, C9, C17 | multilayer ceramic chip capacitor | 100 nF, 50 V | SMD 0805 |
| C11, C13, C14, C16 | multilayer ceramic chip capacitor | 82 pF | Murata: HiQ, GQM21 series, SMD 805 |
| C12, C15 | multilayer ceramic chip capacitor | 2.4 pF | Murata: HiQ, GQM21 series, SMD 805 |
| R1, R8 | resistor | 1 kΩ, 1 % | SMD 805 |
| R2, R9 | resistor | 1 kΩ, 1 % | SMD 805 |
| R3, R7 | resistor | 56 kΩ, 1 % [1] | SMD 805 |
| R4, R6 | resistor | 56 kΩ, 1 % [1] | SMD 805 |
| R5, R10 | resistor | 50 Ω, 25 W | Anaren: C16A50Z4 |
| L1, L2 | RF choke | 5 × 3 mm | |
| CLP1, CLP2 | hybrid coupler | 3 dB, 90° | Anaren: X3C09P1-03S |

[1] Tune for $I_{Dq}$ driver.

## 8.1 Possible circuit topologies

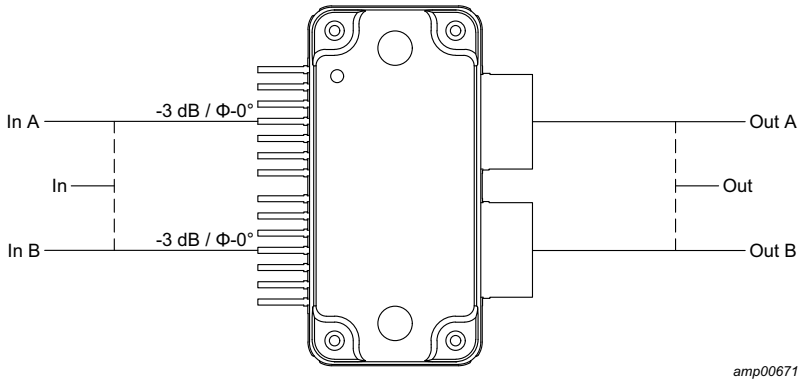



**Fig 4. Dual section or single ended**

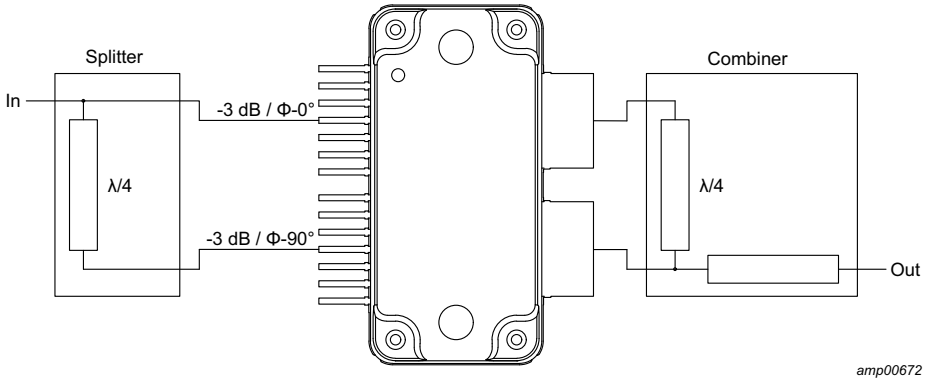



**Fig 5. Doherty**

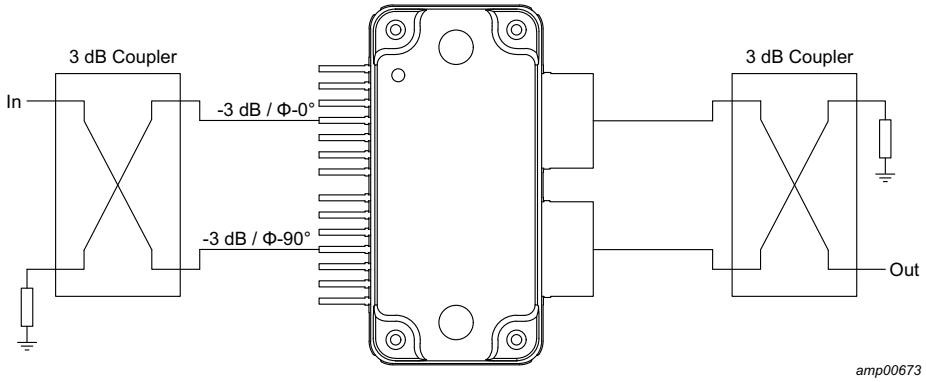



**Fig 6. Quadrature combined**

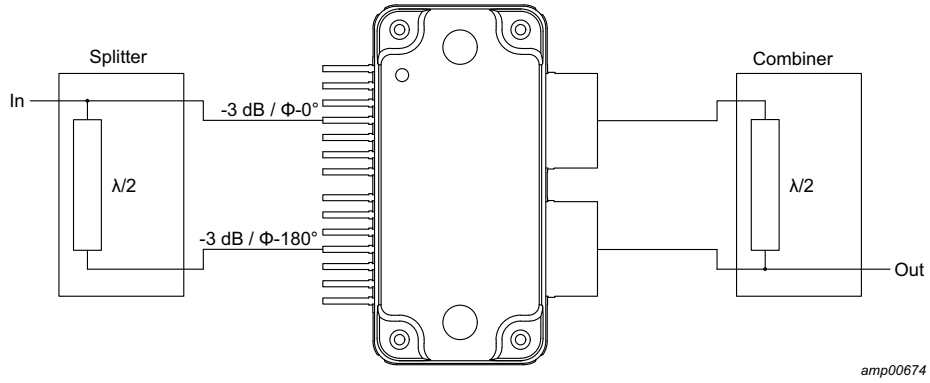



**Fig 7. Push-pull**

## 8.2 Ruggedness in a Doherty operation

The BLM9H0610S-60PG is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS}$ = 55 V; $I_{Dq1}$ = 25 mA (driver); $I_{Dq2}$ = 125 mA (final); at CW $P_L$ = 25 W under $Z_S$ = 50 Ω; f = 925 MHz.

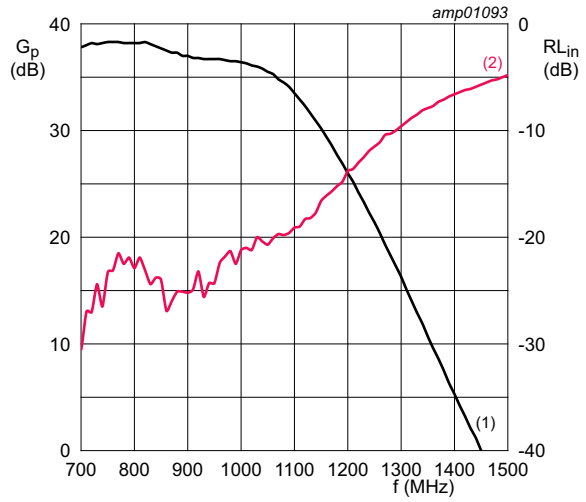
## 8.3 Impedance information

**Table 10. Typical impedance tuned for maximum output power**

*Measured load-pull data per section; test signal: pulsed CW; $T_{case}$ = 25 °C; $V_{DS}$ = 48 V; $I_{Dq1}$ = 25 mA (driver); $I_{Dq2}$ = 125 mA (final); $t_p$ = 100 μs; $\delta$ = 10 %; $Z_S$ = 50 Ω. Typical values unless otherwise specified.*

| | tuned for maximum output power | | | | | tuned for maximum power added efficiency | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| f | $Z_L$ | $G_{p(max)}$ | $P_L$ | $\eta_{add}$ | AM-PM conversion | $Z_L$ | $G_{p(max)}$ | $P_L$ | $\eta_{add}$ | AM-PM conversion |
| (MHz) | (Ω) | (dB) | (W) | (%) | (deg) | (Ω) | (dB) | (W) | (%) | (deg) |
| 652.0 | 6.9 + j 7.5 | 38.0 | 49.3 | 57.2 | –3.0 | 4.7 + j 15.3 | 41.2 | 21.7 | 65.0 | –12.5 |
| 698.0 | 9.7 + j 6.4 | 37.7 | 52.9 | 60.9 | –5.2 | 7.8 + j 12.4 | 39.4 | 37.1 | 68.0 | –5.4 |
| 720.0 | 10.6 + j 4.2 | 36.7 | 54.0 | 57.1 | 1.8 | 7.8 + j 12.3 | 39.1 | 35.7 | 66.9 | –3.5 |
| 746.0 | 10.7 + j 4.3 | 36.4 | 56.3 | 58.6 | –1.2 | 7.8 + j 12.4 | 39.1 | 35.3 | 67.8 | –4.4 |
| 769.0 | 10.9 + j 5.9 | 36.7 | 58.1 | 63.6 | –1.2 | 7.8 + j 12.3 | 38.4 | 38.2 | 70.6 | –5.9 |
| 798.0 | 13.1 + j 4.7 | 36.4 | 56.7 | 60.5 | –2.7 | 6.1 + j 12.1 | 38.5 | 33.1 | 69.2 | –10.0 |
| 820.0 | 12.5 + j 5.2 | 36.5 | 56.0 | 63.7 | –0.2 | 6.7 + j 11.2 | 38.4 | 36.4 | 71.3 | –12.6 |
| 869.0 | 13.2 + j 2.2 | 35.8 | 54.4 | 56.9 | –6.2 | 6.6 + j 9.8 | 38.0 | 40.5 | 70.7 | –6.0 |
| 880.0 | 12.6 + j 5.2 | 36.0 | 54.4 | 62.1 | –1.5 | 6.7 + j 11.2 | 38.6 | 33.8 | 69.9 | –12.6 |
| 894.0 | 12.5 + j 5.2 | 35.9 | 54.1 | 61.8 | –6.4 | 6.5 + j 9.7 | 37.8 | 40.1 | 70.0 | –5.6 |
| 920.0 | 13.0 + j 2.3 | 35.4 | 51.8 | 55.4 | –2.1 | 6.5 + j 9.8 | 38.2 | 37.3 | 69.7 | –6.0 |
| 940.0 | 10.0 + j 4.6 | 35.7 | 54.9 | 62.6 | 2.1 | 5.0 + j 10.0 | 37.9 | 33.4 | 71.9 | –4.9 |
| 960.0 | 8.5 + j 5.4 | 36.1 | 54.6 | 66.0 | –4.1 | 4.9 + j 8.6 | 37.8 | 38.0 | 71.9 | –4.1 |
| 1000.0 | 7.8 + j 4.1 | 35.3 | 58.5 | 66.0 | –0.3 | 4.4 + j 7.4 | 36.8 | 41.3 | 73.5 | –8.7 |

## 8.4 Graphs

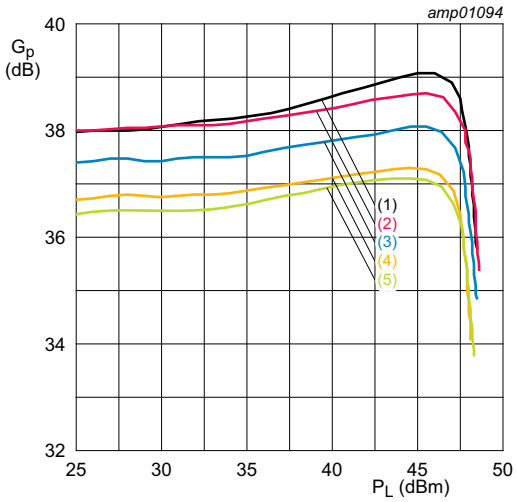



$V_{DS}$ = 48 V; $I_{Dq1}$ = 22 mA (driver); $I_{Dq2}$ = 96 mA (final); per section; network analyzer frequency sweep of quadrature combined demo at $P_L$ = 33.8 dBm.

(1) magnitude of $G_p$

(2) magnitude of $RL_{in}$

**Fig 8. Power gain and input return loss as function of frequency; typical values**




$V_{DS}$ = 48 V; $I_{Dq1}$ = 22 mA (driver); $I_{Dq2}$ = 96 mA (final); per section; pulsed CW ($t_p$ = 100 µs; $\delta$ = 10 %); power sweep of quadrature combined demo.

(1) f = 758 MHz

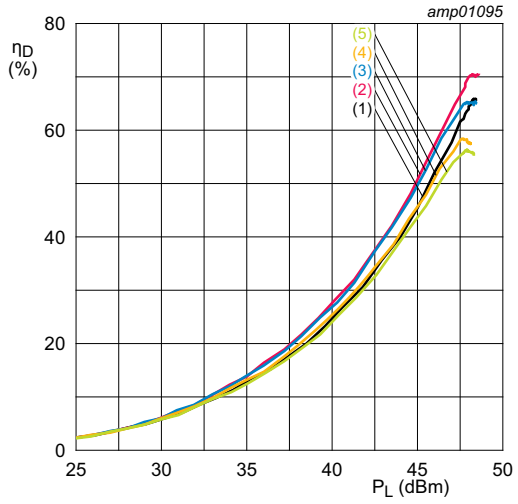
(2) f = 806 MHz

(3) f = 853 MHz

(4) f = 905 MHz

(5) f = 960 MHz

**Fig 9. Power gain as a function of output power; typical values**




$V_{DS}$ = 48 V; $I_{Dq1}$ = 22 mA (driver); $I_{Dq2}$ = 96 mA (final); per section; pulsed CW ($t_p$ = 100 μs; δ = 10 %); power sweep of quadrature combined demo.

(1) f = 758 MHz

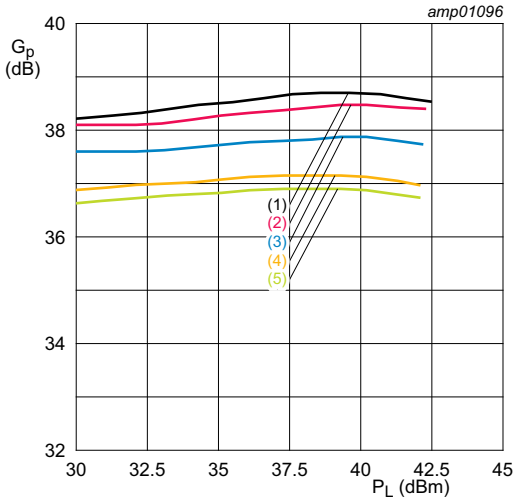
(2) f = 806 MHz

(3) f = 853 MHz

(4) f = 905 MHz

(5) f = 960 MHz

**Fig 10. Drain efficiency as a function of output power; typical values**




$V_{DS}$ = 48 V; $I_{Dq1}$ = 22 mA (driver); $I_{Dq2}$ = 96 mA (final); per section; 1-carrier W-CDMA (test model 1; PAR = 9.9 dB at 0.0.1 % probability on CCDF); power sweep of quadrature combined demo.

(1) f = 758 MHz

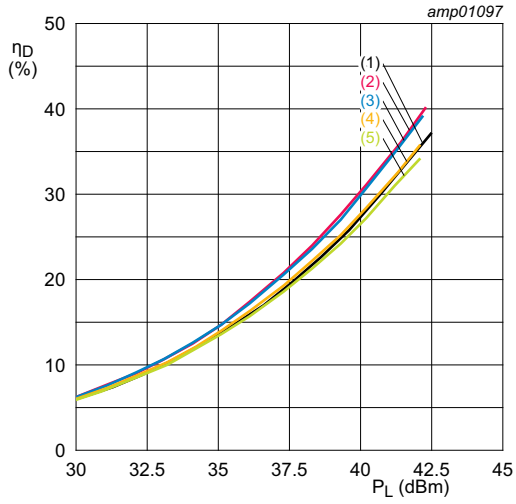
(2) f = 806 MHz

(3) f = 853 MHz

(4) f = 905 MHz

(5) f = 960 MHz

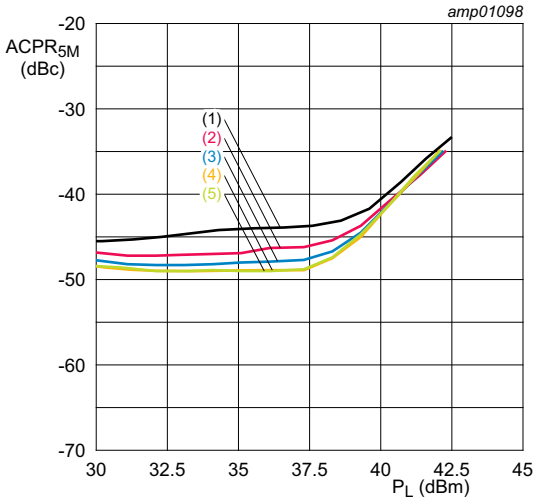
**Fig 11. Power gain as a function of output power; typical values**




$V_{DS}$ = 48 V; $I_{Dq1}$ = 22 mA (driver); $I_{Dq2}$ = 96 mA (final); per section; 1-carrier W-CDMA (test model 1; PAR = 9.9 dB at 0.0.1 % probability on CCDF); power sweep of quadrature combined demo.

(1) f = 758 MHz
(2) f = 806 MHz
(3) f = 853 MHz
(4) f = 905 MHz
(5) f = 960 MHz

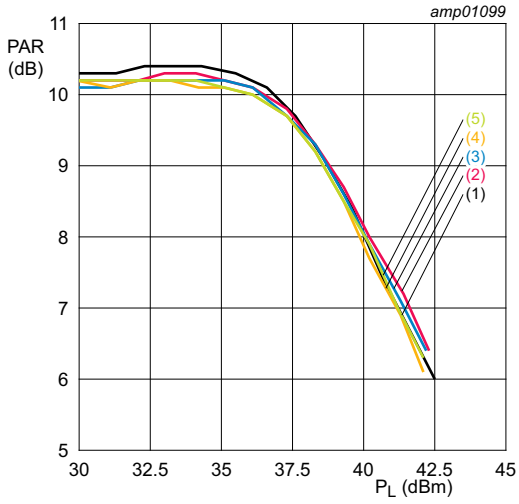
**Fig 12. Drain efficiency as a function of output power; typical values**




$V_{DS}$ = 48 V; $I_{Dq1}$ = 22 mA (driver); $I_{Dq2}$ = 96 mA (final); per section; 1-carrier W-CDMA (test model 1; PAR = 9.9 dB at 0.0.1 % probability on CCDF); power sweep of quadrature combined demo.

(1) f = 758 MHz
(2) f = 806 MHz
(3) f = 853 MHz
(4) f = 905 MHz
(5) f = 960 MHz

**Fig 13. Adjacent channel power ratio (5 MHz) as a function of output power; typical values**




$V_{DS}$ = 48 V; $I_{Dq1}$ = 22 mA (driver); $I_{Dq2}$ = 96 mA (final); per section; 1-carrier W-CDMA (test model 1; PAR = 9.9 dB at 0.0.1 % probability on CCDF); power sweep of quadrature combined demo.

(1) f = 758 MHz

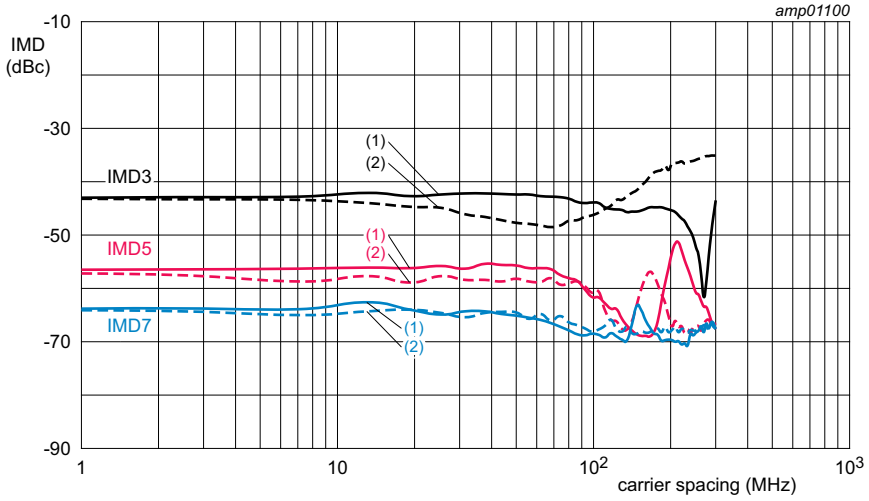
(2) f = 806 MHz

(3) f = 853 MHz

(4) f = 905 MHz

(5) f = 960 MHz

**Fig 14. Peak-to-average power ratio as a function of output power; typical values**

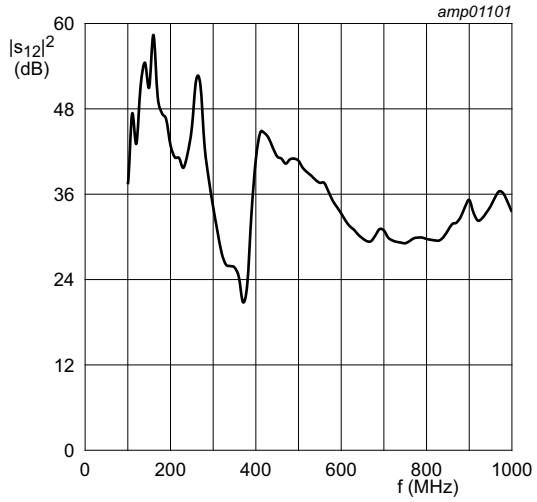



$V_{DS}$ = 48 V; $I_{Dq1}$ = 22 mA (driver); $I_{Dq2}$ = 96 mA (final); per section at f = 853 MHz and $P_L$ = 33.9 dBm; VBW capability of quadrature combined demo.

(1) IMD low

(2) IMD high

**Fig 15. Intermodulation distortion as a function of tone spacing; typical values**




$V_{DS}$ = 48 V; $I_{Dq1}$ = 22 mA (driver); $I_{Dq2}$ = 96 mA (final); per section; typical small signal isolation between section A and B on a soldered device.

**Fig 16. Isolation as a function of frequency; typical values**

## 9. Package outline

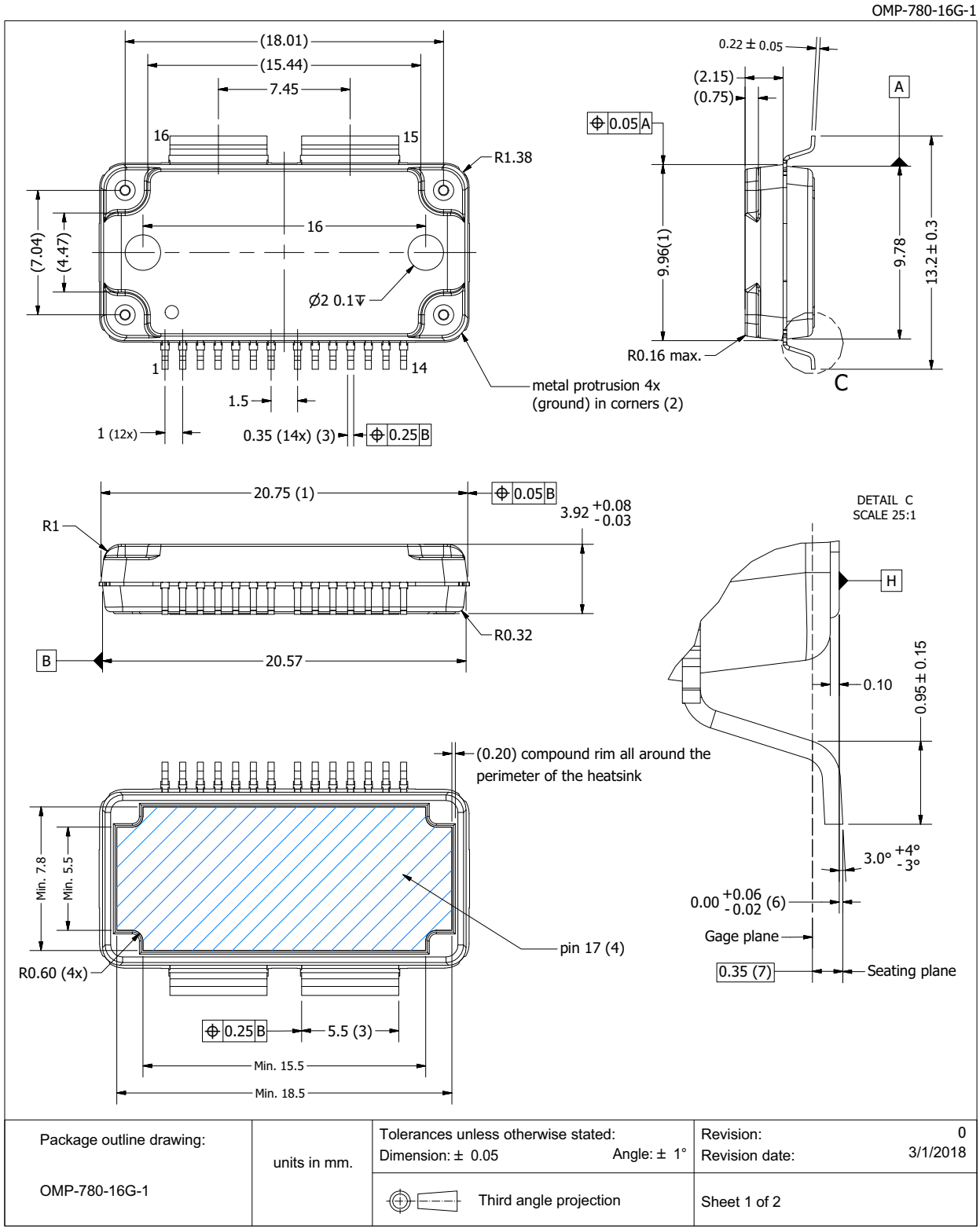
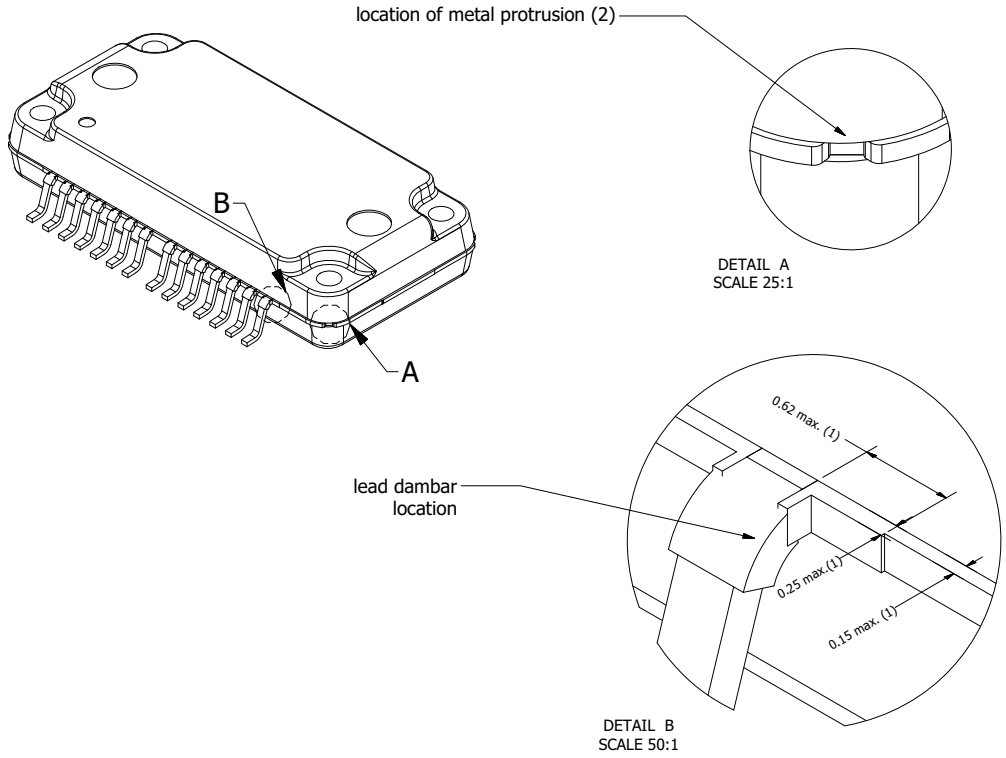



**Fig 17. Package outline OMP-780-16G-1 (sheet 1 of 2)**

OMP-780-16G-1

| Drawing Notes | |
|---|---|
| Items | Description |
| (1) | Dimensions are excluding mold protrusion. Areas located adjacent to the leads have a maximum mold protrusion of 0.25 mm (per side) and 0.62 mm max. in length. In between the 14 leads the protrusion is 0.25 mm max. At all other areas the mold protrusion is maximum 0.15 mm per side. See also detail B. |
| (2) | The metal protrusion (tie bars) in the corner will not stick out of the molding compound protrusions (detail A). |
| (3) | The lead dambar (metal) protrusions are not included. Add 0.14 mm max to the total lead dimension at the dambar location. |
| (4) | The hatched area indicated the exposed heatsink. |
| (5) | The leads and exposed heatsink are plated with matte Tin (Sn). |
| (6) | Dimension is measured with respect to the bottom of the heatsink Datum H. Positive value means that the bottom of the heatsink is higher than the bottom of the lead. |
| (7) | Gage plane (foot length) to be measured from the seating plane. |




| | | | |
|---|---|---|---|
| Package outline drawing:<br>OMP-780-16G-1 | units in mm. | Tolerances unless otherwise stated:<br>Dimension: ± 0.05 Angle: ± 1°<br>Third angle projection | Revision: 0<br>Revision date: 3/1/2018<br>Sheet 2 of 2 |

**Fig 18. Package outline OMP-780-16G-1 (sheet 2 of 2)**

# 10. Handling information

**CAUTION**

This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.

Such precautions are described in the *ANSI/ESD S20.20*, *IEC/ST 61340-5*, *JESD625-A* or equivalent standards.

**Table 11. ESD sensitivity**

| ESD model | Class |
|---|---|
| Charged Device Model (CDM); According to ANSI/ESDA/JEDEC standard JS-002 | C2A [1] |
| Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001 | 1C [2] |

[1] CDM classification C2A is granted to any part that passes after exposure to an ESD pulse of 500 V.

[2] HBM classification 1C is granted to any part that passes after exposure to an ESD pulse of 1000 V.

# 11. Abbreviations

**Table 12. Abbreviations**

| Acronym | Description |
|---|---|
| 3GPP | 3rd Generation Partnership Project |
| CCDF | Complementary Cumulative Distribution Function |
| CW | Continuous Wave |
| DPCH | Dedicated Physical CHannel |
| ESD | ElectroStatic Discharge |
| GEN9 | Ninth Generation |
| HV | High Voltage |
| LDMMIC | Laterally Diffused Monolithic Microwave Integrated Circuit |
| LDMOS | Laterally Diffused Metal Oxide Semiconductor |
| MMIC | Monolithic Microwave Integrated Circuit |
| MTF | Median Time to Failure |
| PAR | Peak-to-Average Ratio |
| RoHS | Restriction of Hazardous Substances |
| SMD | Surface Mounted Device |
| VBW | Video BandWidth |
| W-CDMA | Wideband Code Division Multiple Access |

## 12. Revision history

**Table 13. Revision history**

| Document ID | Release date | Data sheet status | Change notice | Supersedes |
|---|---|---|---|---|
| BLM9H0610S-60PG v.2 | 20220422 | Product data sheet | - | BLM9H0610S-60PG v.1 |
| Modifications: | • Section 5 on page 3: changed case temperature value from 110 °C to 125 °C<br>• Section 13.2 on page 18: updated section<br>• Section 13.3 on page 18: updated section | | | |
| BLM9H0610S-60PG v.1 | 20200306 | Product data sheet | - | - |

# 13. Legal information

## 13.1 Data sheet status

| Document status[1][2] | Product status[3] | 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".

[3] The product status of device(s) described in this document may have changed since this document was published and may differ in case of multiple devices. The latest product status information is available on the Internet at URL http://www.ampleon.com.

## 13.2 Definitions

**Draft —** The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Ampleon does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

**Short data sheet —** A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Ampleon sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

**Product specification —** The information and data provided in a Product data sheet shall define the specification of the product as agreed between Ampleon and its customer, unless Ampleon and customer have explicitly agreed otherwise in writing. An agreement according to which the functions and qualities of Ampleon products exceed those described in the Product data sheet is invalid.

## 13.3 Disclaimers

**Maturity —** After the relevant product(s) have passed the Release Gate in Ampleon's release process, Ampleon will confirm the final version in writing.

**Limited warranty and liability —** Ampleon uses its best efforts to keep the information in this document accurate and reliable. However, Ampleon gives no representations or warranties, expressed or implied, as to the accuracy or completeness of such information and assumes no liability for the consequences of the use of such information. Ampleon is not liable for content provided by an external information source.

In no event and irrespective of the legal basis (contract, tort (including negligence) statutory liability, misrepresentation, indemnity or any other area of law) shall Ampleon be liable for any indirect, incidental, punitive, special or consequential damages (including but without limitation loss of profit or revenue, loss of use or loss of production, loss of data, cost of capital, cost of substitute goods, property damage external to the Ampleon products and any damage, expenditure or loss arising out of such damage, business interruption, costs related to the removal or replacement of any products or rework charges) or any of the foregoing suffered by any third party.

Notwithstanding any damages that customer might incur for any reason whatsoever, Ampleon's aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of Ampleon.

**Right to make changes —** Ampleon reserves the right to change information including but without limitation specifications and product descriptions published in this document at any time and without notice. This document supersedes and replaces all information regarding these products supplied prior to the publication hereof.

**Suitability for use —** Ampleon products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an Ampleon product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Insofar as a customer or another party nevertheless uses Ampleon products unlawfully for such purposes, Ampleon and its suppliers are not liable for any damages.

**Applications —** Applications that are described herein for any of these products are for illustrative purposes only. Ampleon makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using Ampleon products, and Ampleon is not liable for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Ampleon product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers shall provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Ampleon is not liable related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for and shall do all necessary testing for the customer's applications and products using Ampleon products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Ampleon is not liable in this respect.

**Limiting values —** Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not guaranteed. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

**Terms and conditions of commercial sale —** Ampleon products are sold subject to the general terms and conditions of commercial sale, as published at http://www.ampleon.com/terms, unless otherwise agreed in a valid written individual agreement. In the event of signing an individual agreement the terms and conditions of the respective agreement shall apply. Ampleon hereby expressly objects to and rejects the validity of customer's terms and conditions regarding the purchase of Ampleon products by customer.

**No offer to sell or license —** Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

**Export control —** This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

**Non-automotive qualified products —** Unless this data sheet expressly states that this specific Ampleon product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. Ampleon is not liable for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer breaches this and uses the products for design and use in automotive applications in accordance with automotive specifications and standards, (a) Ampleon gives no warranty, representation or other guarantees of any kind with respect to such automotive applications, use and specifications, and (b) such use is solely and exclusively at customer's own risk, and (c) customer fully indemnifies Ampleon against any and all liability, damages or failed product claims, including against third parties, arising out of customer's design and use of the product for automotive applications.

**Translations —** A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

### 13.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

## 14. Contact information

For more information, please visit: **http://www.ampleon.com**

For sales office addresses, please visit: **http://www.ampleon.com/sales**

## 15. Contents





For more information, please visit: http://www.ampleon.com
For sales office addresses, please visit: http://www.ampleon.com/sales

**Date of release: 22 April 2022**
**Document identifier: BLM9H0610S-60PG**