

# BLP15M9S100G

Power LDMOS transistor

Rev. 4 — 12 January 2023

AMPLEON

Product data sheet

## 1. Product profile

---

### 1.1 General description

A 100 W general purpose LDMOS RF power transistor for broadcast and ISM applications in HF to 1500 MHz band.

Table 1. Application performance

Test signal	f	P <sub>L</sub>	G <sub>p</sub>	η <sub>D</sub>	RL <sub>in</sub>
	(MHz)	(W)	(dB)	(%)	(dB)
pulsed CW	1400	100	16	68	-21

### 1.2 Features and benefits

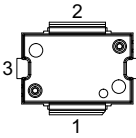
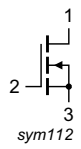
- High efficiency
- Integrated dual sided ESD protection
- Excellent ruggedness
- High power gain
- Excellent reliability
- Easy power control
- For RoHS compliance see the product details on the Ampleon website

### 1.3 Applications

- Industrial, scientific and medical applications
- Broadcast transmitter applications
- RF power amplifiers for CW applications

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source <sup>[1]</sup>		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Package name	Orderable part number	12NC	Packing description	Min. orderable quantity (pieces)
TO-270-2G-1	BLP15M9S100GZ	9349 602 41515	TR13; 500-fold; 24 mm; dry pack	500
	BLP15M9S100GXY	9349 602 41538	TR7; 100-fold; 24 mm; dry pack	100

## 4. 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		-	65	V
$V_{GS}$	gate-source voltage		-5	+13	V
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature	<sup>[1]</sup>	-	225	°C

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

## 5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 85\text{ °C}; V_{DS} = 32\text{ V}; P_L = 100\text{ W}$	0.6	K/W

## 6. Characteristics

**Table 6. DC characteristics**

$T_j = 25\text{ °C}$ ; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ ; $I_D = 1\text{ mA}$	65	70	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 100\text{ mA}$	1.5	2.0	2.5	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 32\text{ V}$	-	-	1.4	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	-	19	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$	-	-	140	nA
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 3.5\text{ A}$	-	143	-	$\text{m}\Omega$

**Table 7. AC characteristics**

$T_j = 25\text{ °C}$ ; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$C_{iss}$	input capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 32\text{ V}$ ; $f = 1\text{ MHz}$	-	89	-	pF
$C_{oss}$	output capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 32\text{ V}$ ; $f = 1\text{ MHz}$	-	32	-	pF
$C_{rss}$	reverse transfer capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 32\text{ V}$ ; $f = 1\text{ MHz}$	-	0.7	-	pF

**Table 8. RF characteristics**

RF characteristics in Ampleon production test circuit; typical RF performance at  $T_{case} = 25\text{ °C}$ ;  
 $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 400\text{ mA}$ ;  $t_p = 100\text{ }\mu\text{s}$ ;  $\delta = 10\%$ .

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Pulsed RF, class-AB</b>						
$G_p$	power gain	$f = 1400\text{ MHz}$ ; $P_L = 100\text{ W}$	14.5	16	-	dB
$\eta_D$	drain efficiency	$f = 1400\text{ MHz}$ ; $P_L = 100\text{ W}$	63	66	-	%
$RL_{in}$	input return loss	$f = 1400\text{ MHz}$ ; $P_L = 100\text{ W}$	-	-18	-	dB

## 7. Test information

### 7.1 Ruggedness in class-AB operation

The BLP15M9S100G is capable of withstanding a load mismatch corresponding to a  $V_{SWR} = 10 : 1$  through all phases under the following conditions:  $V_{DS} = 32\text{ V}$ ;  $f = 1400\text{ MHz}$  at rated load power on RF development board using a pulsed CW RF signal which has  $\sim 150\text{ ns}$  rise and fall time.

7.2 Test circuit

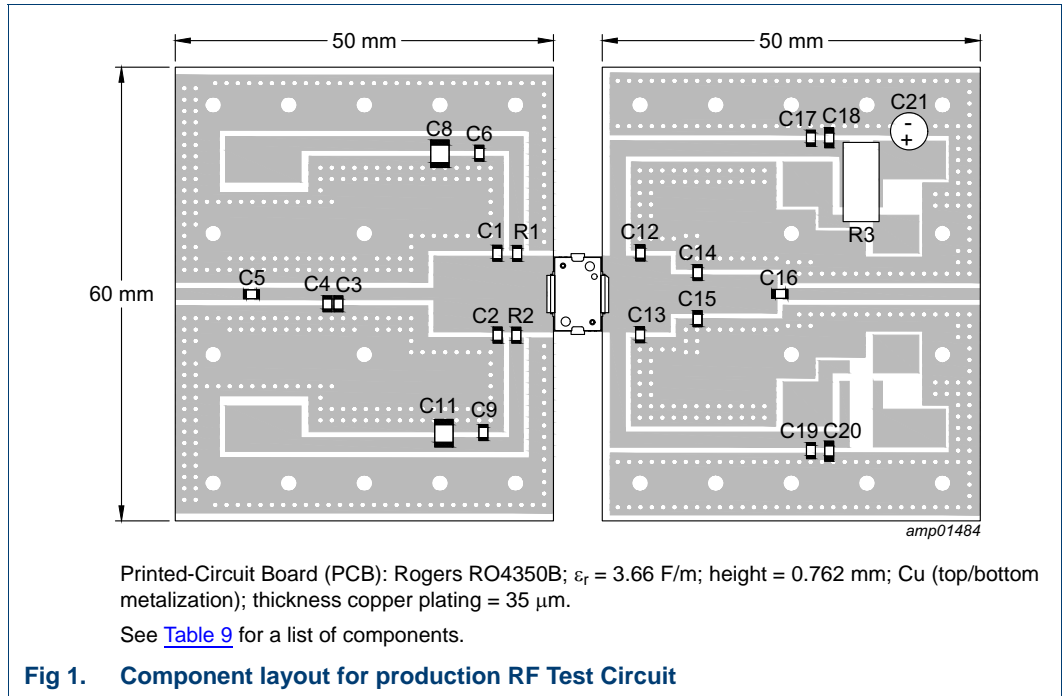
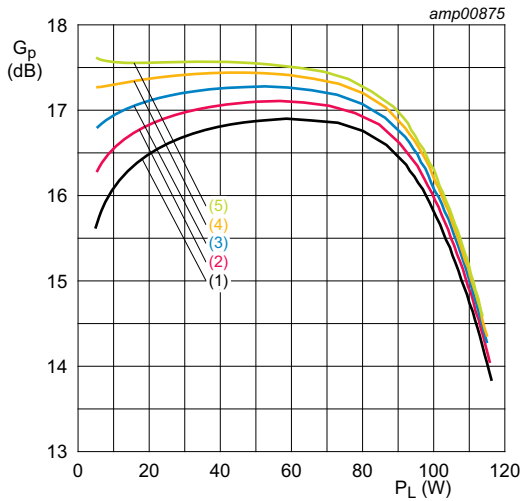


Table 9. List of components

See [Figure 1](#) for component layout.

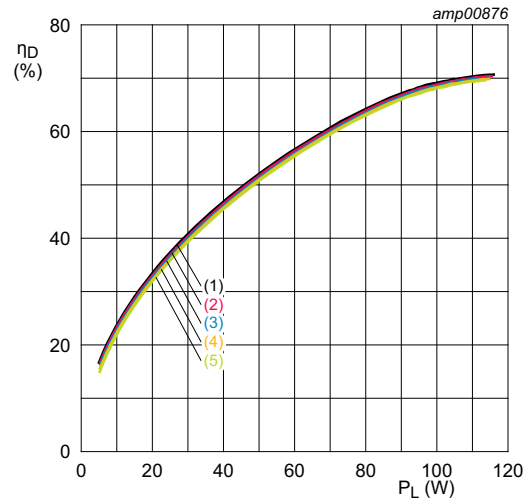
Component	Description	Value	Remarks
C1, C2	multilayer ceramic chip capacitor	6.2 pF	ATC 800A
C3	multilayer ceramic chip capacitor	2 pF	ATC 800A
C4	multilayer ceramic chip capacitor	0.9 pF	ATC 800A
C5, C6, C9, C17, C19, C16	multilayer ceramic chip capacitor	100 pF	ATC 800A
C8, C11, C18, C20	multilayer ceramic chip capacitor	100 nF, 100 V	
C12, C13	multilayer ceramic chip capacitor	3 pF	ATC 800A
C14, C15	multilayer ceramic chip capacitor	2.1 pF	ATC 800A
C21	electrolytic capacitor	220 $\mu\text{F}$ , 63 V	
R1, R2	chip resistor	10 $\Omega$	SMD 0805
R3	shunt resistor	10 m $\Omega$	for current monitoring

7.3 Graphical data



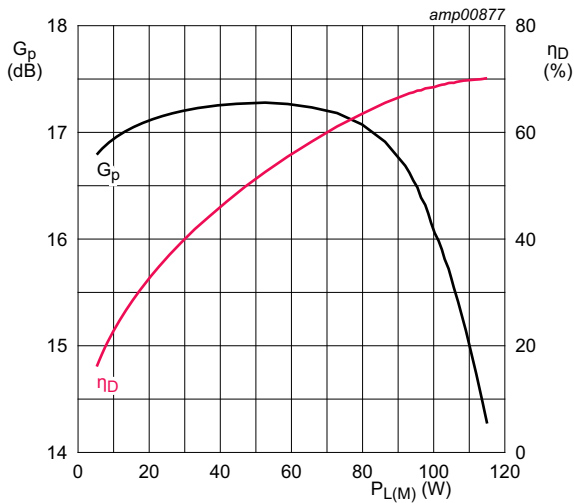
$V_{DS} = 32\text{ V}; f = 1400\text{ MHz}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .  
 (1)  $I_{Dq} = 200\text{ mA}$   
 (2)  $I_{Dq} = 300\text{ mA}$   
 (3)  $I_{Dq} = 400\text{ mA}$   
 (4)  $I_{Dq} = 500\text{ mA}$   
 (5)  $I_{Dq} = 600\text{ mA}$

**Fig 2. Power gain as a function of output power; typical values**



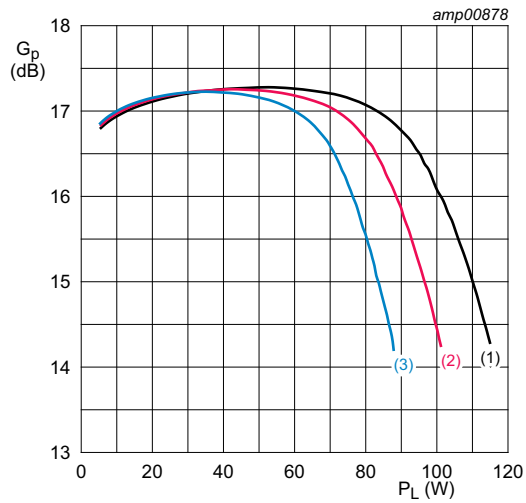
$V_{DS} = 32\text{ V}; f = 1400\text{ MHz}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .  
 (1)  $I_{Dq} = 200\text{ mA}$   
 (2)  $I_{Dq} = 300\text{ mA}$   
 (3)  $I_{Dq} = 400\text{ mA}$   
 (4)  $I_{Dq} = 500\text{ mA}$   
 (5)  $I_{Dq} = 600\text{ mA}$

**Fig 3. Drain efficiency as a function of output power; typical values**



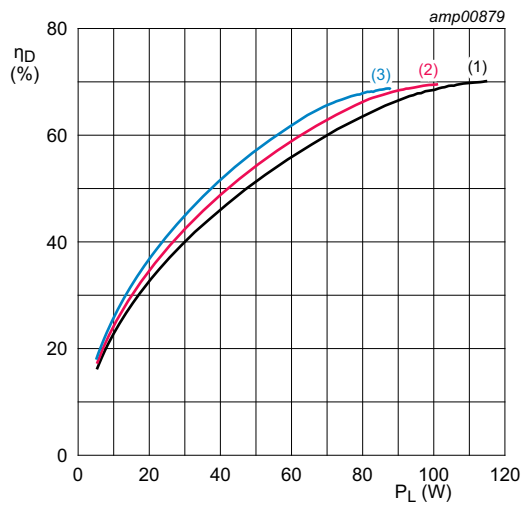
$V_{DS} = 32\text{ V}; I_{Dq} = 400\text{ mA}; f = 1400\text{ MHz}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .

**Fig 4. Power gain and drain efficiency as function of peak output power; typical values**



$I_{Dq} = 400\text{ mA}; f = 1400\text{ MHz}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$ .  
 (1)  $V_{DS} = 32\text{ V}$   
 (2)  $V_{DS} = 30\text{ V}$   
 (3)  $V_{DS} = 28\text{ V}$

**Fig 5. Power gain as a function of output power; typical values**



$I_{Dq} = 400 \text{ mA}$ ;  $f = 1400 \text{ MHz}$ ;  $t_p = 100 \text{ }\mu\text{s}$ ;  $\delta = 10 \text{ \%}$ .

- (1)  $V_{DS} = 32 \text{ V}$
- (2)  $V_{DS} = 30 \text{ V}$
- (3)  $V_{DS} = 28 \text{ V}$

**Fig 6. Drain efficiency as a function of output power; typical values**

8. Package outline

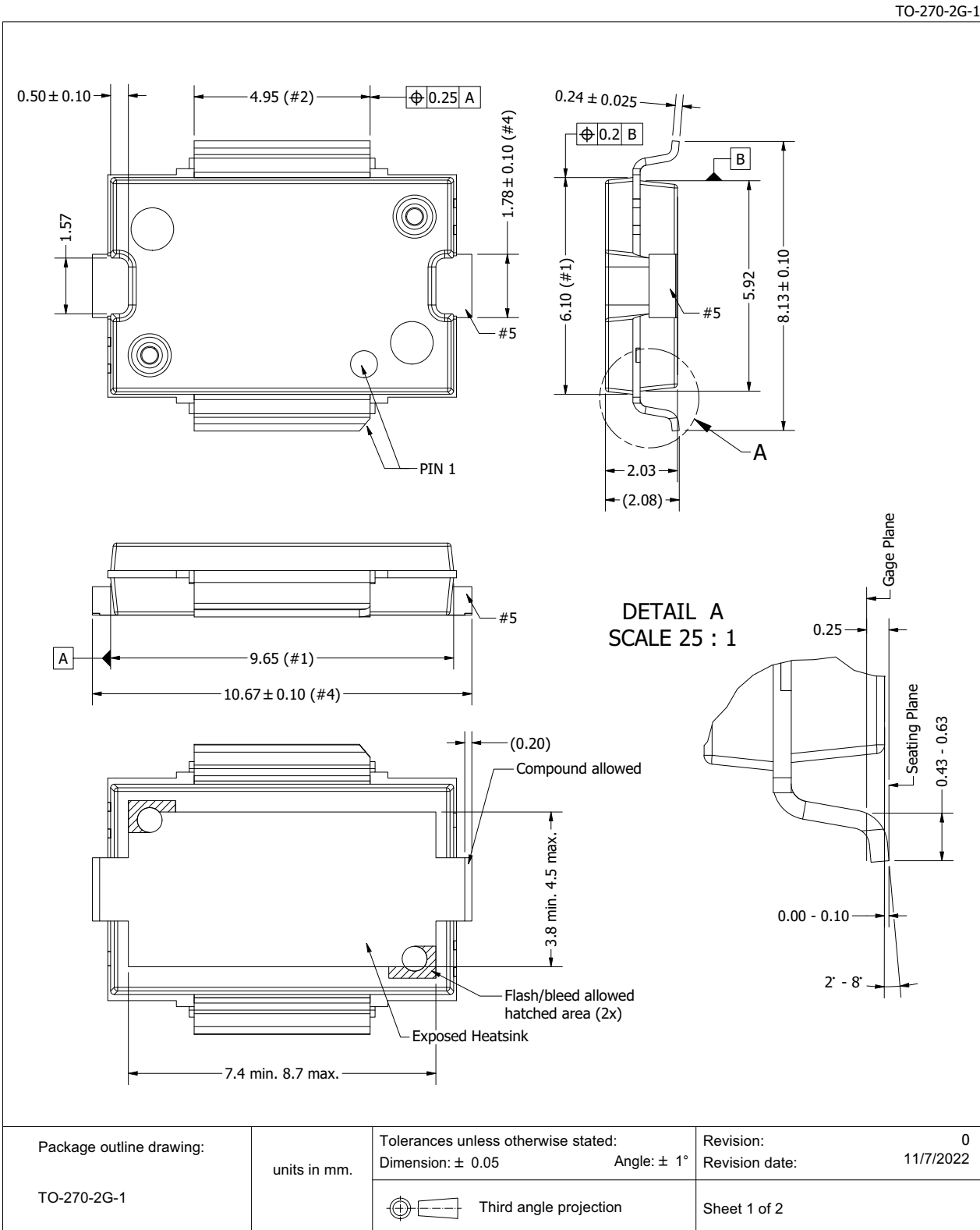


Fig 7. Package outline TO-270-2G-1 (sheet 1 of 2)

TO-270-2G-1

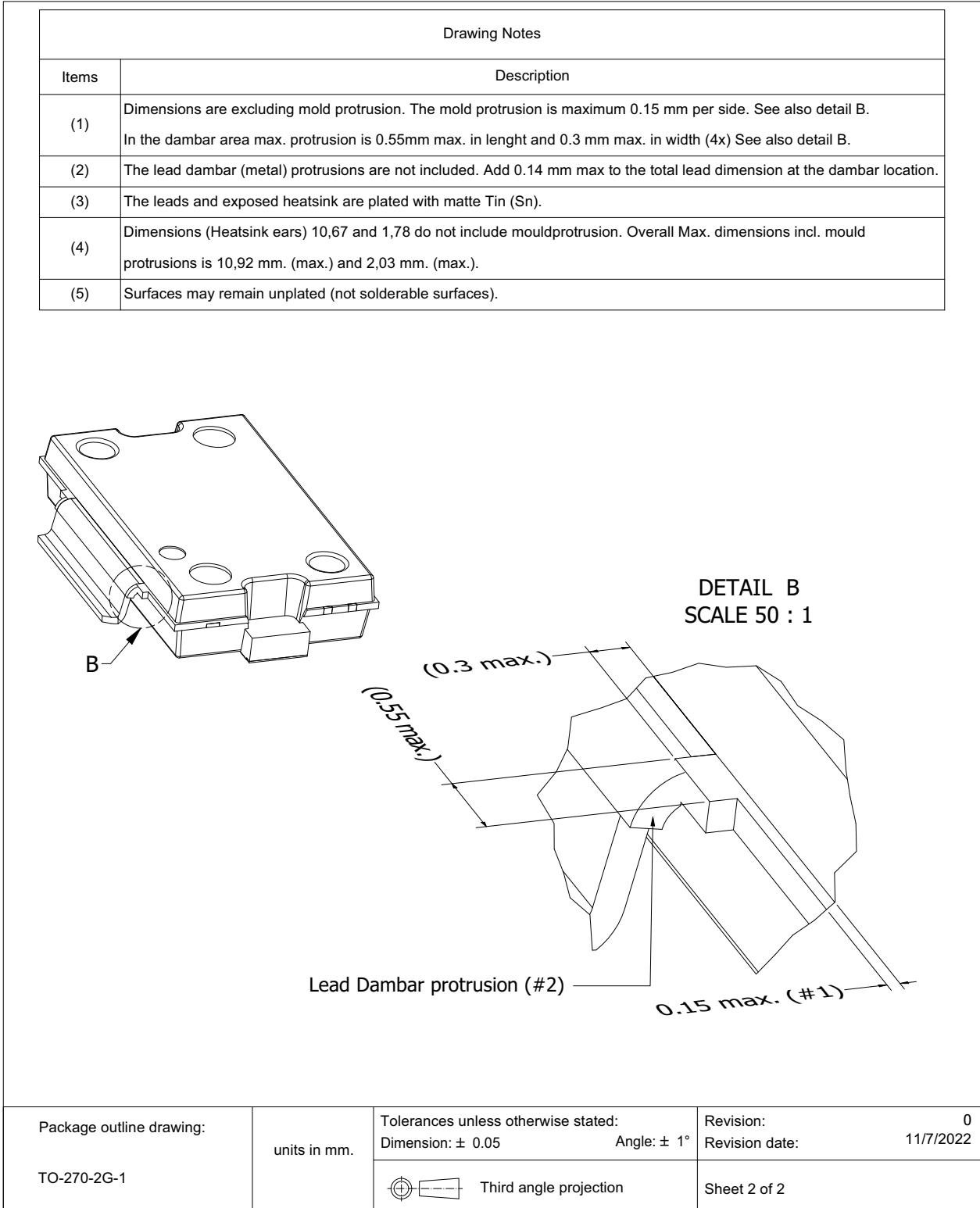


Fig 8. Package outline TO-270-2G-1 (sheet 2 of 2)



## 9. 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 10. ESD sensitivity**

ESD model	Class
Charged Device Model (CDM); According to ANSI/ESDA/JEDEC standard JS-002	C2A <a href="#">[1]</a>
Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001	2 <a href="#">[2]</a>

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

[2] HBM classification 2 is granted to any part that passes after exposure to an ESD pulse of 2000 V.

## 10. Abbreviations

**Table 11. Abbreviations**

Acronym	Description
CW	Continuous Wave
ESD	ElectroStatic Discharge
HF	High Frequency
ISM	Industrial, Scientific and Medical
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
MTF	Median Time to Failure
RoHS	Restriction of Hazardous Substances
SMD	Surface Mounted Device
VSWR	Voltage Standing Wave Ratio

## 11. Revision history

**Table 12. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLP15M9S100G v.4	20230112	Product data sheet	-	BLP15M9S100G v.3
Modifications:	<ul style="list-style-type: none"> <li><a href="#">Table 3 on page 2</a>: package name changed from SOT1483-1 to TO-270-2G-1</li> <li><a href="#">Table 5 on page 2</a>: value changed from 0.9 K/W to 0.6 K/W</li> <li><a href="#">Section 8 on page 7</a>: package outline drawing changed from SOT1483-1 to TO-270-2G-1</li> <li><a href="#">Section 12 on page 10</a>: updated section</li> </ul>			
BLP15M9S100G v.3	20210716	Product data sheet	-	BLP15M9S100G v.2
BLP15M9S100G v.2	20210223	Product data sheet	-	BLP15M9S100G v.1
BLP15M9S100G v.1	20200924	Product data sheet	-	-

## 12. Legal information

### 12.1 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".

[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>.

### 12.2 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.

### 12.3 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.

## 12.4 Trademarks

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

## 13. Contact information

---

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

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

14. Contents

1 **Product profile** . . . . . 1

1.1 General description . . . . . 1

1.2 Features and benefits . . . . . 1

1.3 Applications . . . . . 1

2 **Pinning information** . . . . . 2

3 **Ordering information** . . . . . 2

4 **Limiting values** . . . . . 2

5 **Thermal characteristics** . . . . . 2

6 **Characteristics** . . . . . 3

7 **Test information** . . . . . 3

7.1 Ruggedness in class-AB operation . . . . . 3

7.2 Test circuit . . . . . 4

7.3 Graphical data . . . . . 5

8 **Package outline** . . . . . 7

9 **Handling information** . . . . . 9

10 **Abbreviations** . . . . . 9

11 **Revision history** . . . . . 9

12 **Legal information** . . . . . 10

12.1 Data sheet status . . . . . 10

12.2 Definitions . . . . . 10

12.3 Disclaimers . . . . . 10

12.4 Trademarks . . . . . 11

13 **Contact information** . . . . . 11

14 **Contents** . . . . . 12

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© Ampleon Netherlands B.V. 2023. All rights reserved.

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

Date of release: 12 January 2023  
 Document identifier: BLP15M9S100G