

# BLP15H9S100

Power LDMOS transistor

Rev. 3 — 8 July 2021

AMPLEON

Product data sheet

## 1. Product profile

### 1.1 General description

A 100 W LDMOS driver transistor for broadcast and industrial applications. The excellent ruggedness of this device makes it ideal for digital and analog transmitter applications in the frequency range from HF to 2 GHz.

Table 1. Typical performance

Test signal	f	V <sub>DS</sub>	P <sub>L</sub>	G <sub>p</sub>	η <sub>D</sub>
	(MHz)	(V)	(W)	(dB)	(%)
pulsed RF	1400	50	100	20	62
	1700 to 1850	50	100	16	50
CW	325 to 352	50	90	25	61
	360 to 450	50	100	16	53
DVB-T	169 to 223	50	20	23	30
	470 to 700	50	20	20	30

### 1.2 Features and benefits

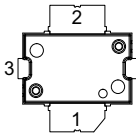
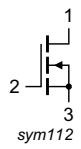
- Designed for broadband operation
- High efficiency
- Integrated dual sided ESD protection
- Excellent ruggedness
- High power gain
- Excellent reliability
- Easy power control
- Excellent stability
- For RoHS compliance see the product details on the Ampleon website

### 1.3 Applications

- Broadcast transmitter applications
- Industrial, scientific and medical applications
- Applicable at frequencies from HF to 2 GHz

## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Package name	Orderable part number	12NC	Packing description	Min. orderable quantity (pieces)
SOT1482-1	BLP15H9S100Z	9349 602 50515	TR13; 500-fold; 24 mm; dry pack	500
SOT1482-1	BLP15H9S100XY	9349 602 50538	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		-	106	V
$V_{GS}$	gate-source voltage		-6	+11	V
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature	[1]	-	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	$T_{case} = 70\text{ °C}$ ; $V_{DS} = 50\text{ V}$ ; $P_L = 100\text{ W}$	0.67	K/W

## 6. Characteristics

**Table 6. DC characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$ ; $I_D = 0.67\text{ mA}$	106	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$ ; $I_D = 67\text{ mA}$	1.5	2.0	2.5	V
$V_{GSq}$	gate-source quiescent voltage	$V_{DS} = 50\text{ V}$ ; $I_D = 30\text{ mA}$	1.5	2.0	2.5	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$	-	-	1.4	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $V_{DS} = 10\text{ V}$	-	11.3	-	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	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ; $I_D = 2.35\text{ A}$	-	0.30	-	$\Omega$

**Table 7. RF characteristics**

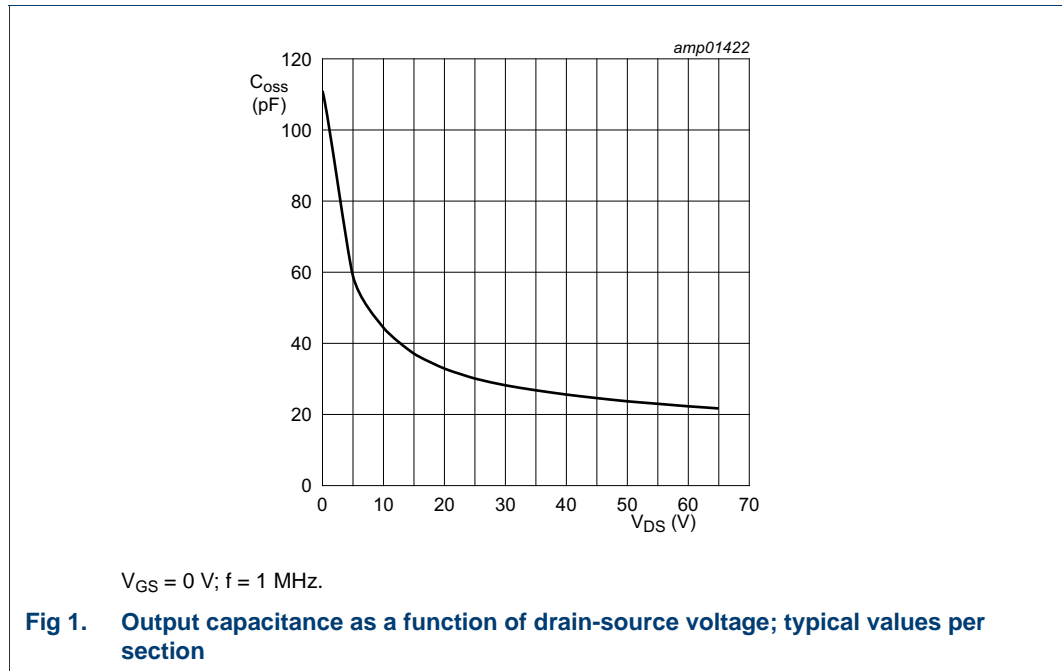
Test signal: pulsed RF;  $t_p = 100\text{ }\mu\text{s}$ ;  $\delta = 20\%$ ;  $f = 1400\text{ MHz}$ ; RF performance at  $V_{DS} = 50\text{ V}$ ;  $I_{DQ} = 30\text{ mA}$ ;  $T_{case} = 25\text{ }^{\circ}\text{C}$ ; unless otherwise specified; in a class-AB production test circuit with Johnstech socket.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$G_p$	power gain	$P_L = 100\text{ W}$	18	19	-	dB
$RL_{in}$	input return loss	$P_L = 100\text{ W}$	-	-14	-6	dB
$\eta_D$	drain efficiency	$P_L = 100\text{ W}$	59	63	-	%

**Table 8. AC characteristics**

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$C_{iss}$	input capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$ ; $f = 1\text{ MHz}$	-	75	-	pF
$C_{oss}$	output capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$ ; $f = 1\text{ MHz}$	-	23.4	-	pF
$C_{rss}$	reverse transfer capacitance	$V_{GS} = 0\text{ V}$ ; $V_{DS} = 50\text{ V}$ ; $f = 1\text{ MHz}$	-	0.53	-	pF

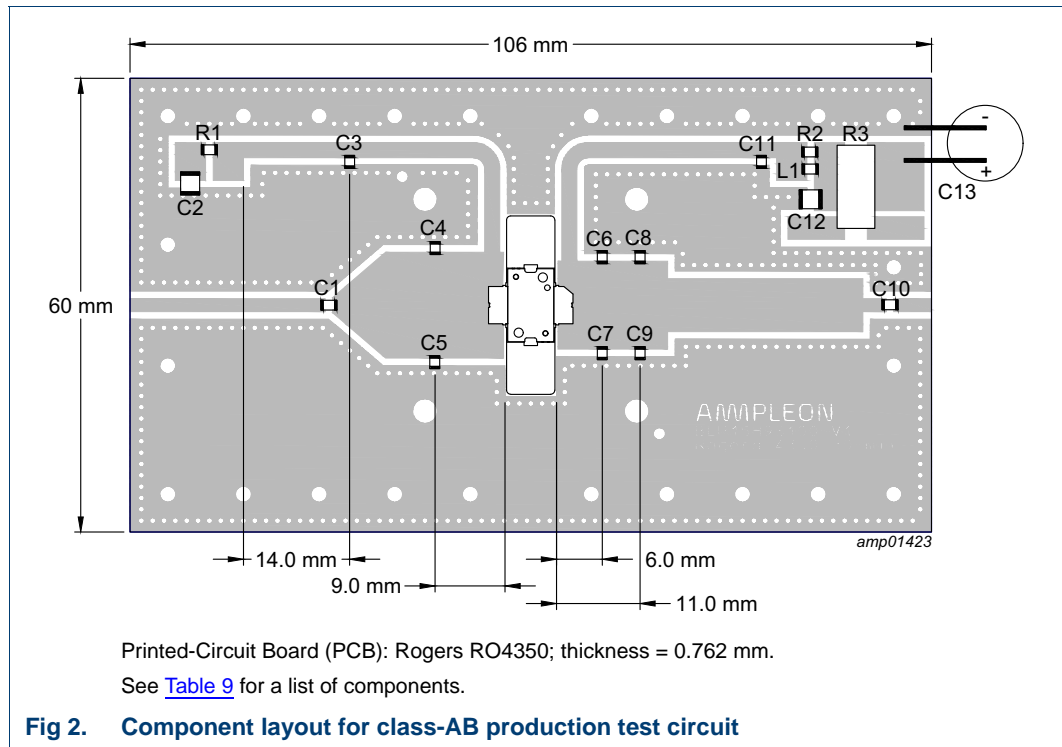


## 7. Test information

### 7.1 Ruggedness in class-AB operation

The BLP15H9S100 is capable of withstanding a load mismatch corresponding to  $V_{SWR} = 30 : 1$  through all phases under the following conditions:  $V_{DS} = 55$  V;  $I_{Dq} = 30$  mA;  $P_L = 120$  W;  $f = 1400$  MHz; pulsed CW ( $t_p = 100$   $\mu$ s;  $\delta = 20$  %).

## 7.2 Test circuit



**Table 9. List of components**

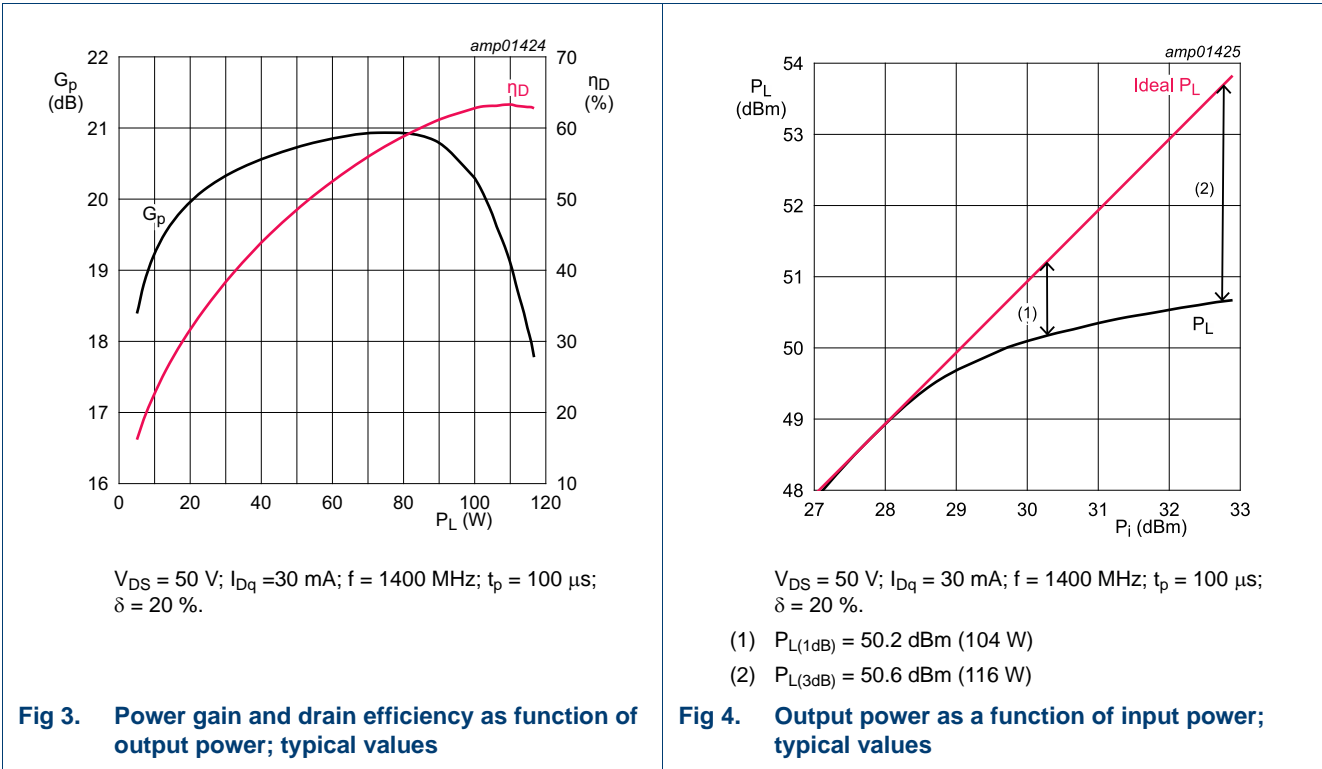
For test circuit see [Figure 2](#).

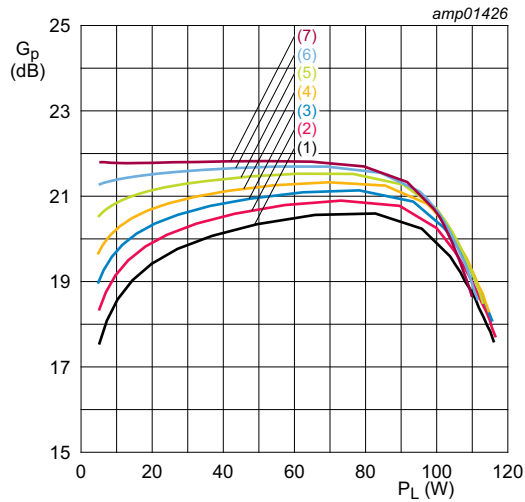
Component	Description	Value	Remarks
C1	multilayer ceramic chip capacitor	2.2 pF <a href="#">[1]</a>	
C2, C12	multilayer ceramic chip capacitor	4.7 $\mu$ F, 100 V	
C3, C11	multilayer ceramic chip capacitor	30 pF <a href="#">[1]</a>	
C4, C5	multilayer ceramic chip capacitor	2.7 pF <a href="#">[1]</a>	
C6, C7	multilayer ceramic chip capacitor	6.8 pF <a href="#">[1]</a>	
C8, C9	multilayer ceramic chip capacitor	3.3 pF <a href="#">[1]</a>	
C10	multilayer ceramic chip capacitor	20 pF <a href="#">[1]</a>	
C13	electrolytic capacitor	470 $\mu$ F, 64 V	
R1	chip resistor	4.7 $\Omega$	SMD 1206
R2	chip resistor	10 $\Omega$	SMD 1206
R3	shunt resistor	0.01 $\Omega$	
L1	inductor	9 nH	Coilcraft: 1508-9N0GLB

[1] American Technical Ceramics type 800A or capacitor of same quality.

7.3 Graphical data

7.3.1 Pulsed CW performance measured in production RF test circuit

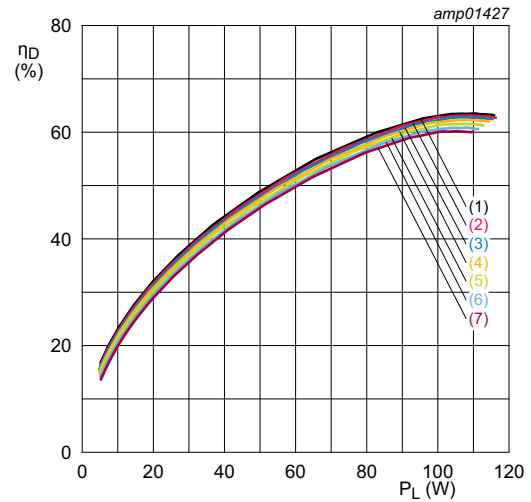




$V_{DS} = 50 \text{ V}$ ;  $f = 1400 \text{ MHz}$ ;  $t_p = 100 \text{ } \mu\text{s}$ ;  $\delta = 20 \text{ } \%$ .

- (1)  $I_{Dq} = 10 \text{ mA}$
- (2)  $I_{Dq} = 30 \text{ mA}$
- (3)  $I_{Dq} = 60 \text{ mA}$
- (4)  $I_{Dq} = 100 \text{ mA}$
- (5)  $I_{Dq} = 200 \text{ mA}$
- (6)  $I_{Dq} = 300 \text{ mA}$
- (7)  $I_{Dq} = 400 \text{ mA}$

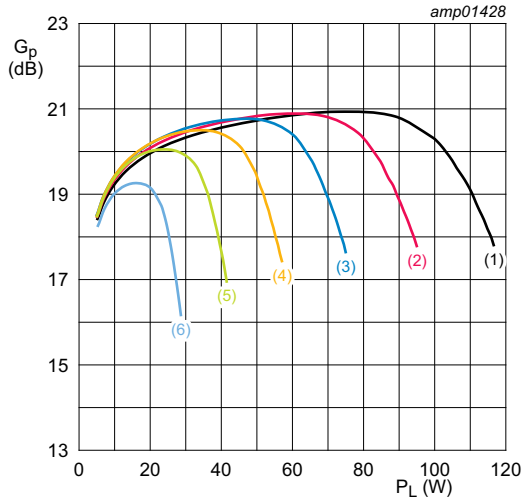
**Fig 5. Power gain as a function of output power; typical values**



$V_{DS} = 50 \text{ V}$ ;  $f = 1400 \text{ MHz}$ ;  $t_p = 100 \text{ } \mu\text{s}$ ;  $\delta = 20 \text{ } \%$ .

- (1)  $I_{Dq} = 10 \text{ mA}$
- (2)  $I_{Dq} = 30 \text{ mA}$
- (3)  $I_{Dq} = 60 \text{ mA}$
- (4)  $I_{Dq} = 100 \text{ mA}$
- (5)  $I_{Dq} = 200 \text{ mA}$
- (6)  $I_{Dq} = 300 \text{ mA}$
- (7)  $I_{Dq} = 400 \text{ mA}$

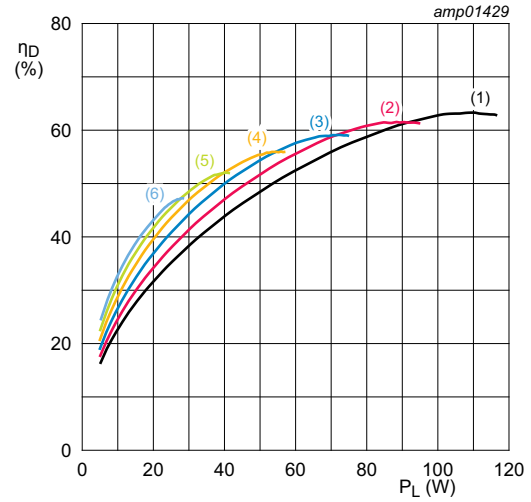
**Fig 6. Drain efficiency as a function of output power; typical values**



$I_{DQ} = 30$  mA;  $f = 1400$  MHz;  $t_p = 100$   $\mu$ s;  $\delta = 20$  %.

- (1)  $V_{DS} = 50$  V
- (2)  $V_{DS} = 45$  V
- (3)  $V_{DS} = 40$  V
- (4)  $V_{DS} = 35$  V
- (5)  $V_{DS} = 30$  V
- (6)  $V_{DS} = 25$  V

**Fig 7. Power gain as a function of output power; typical values**



$I_{DQ} = 30$  mA;  $f = 1400$  MHz;  $t_p = 100$   $\mu$ s;  $\delta = 20$  %.

- (1)  $V_{DS} = 50$  V
- (2)  $V_{DS} = 45$  V
- (3)  $V_{DS} = 40$  V
- (4)  $V_{DS} = 35$  V
- (5)  $V_{DS} = 30$  V
- (6)  $V_{DS} = 25$  V

**Fig 8. Drain efficiency as a function of output power; typical values**



8. Package outline

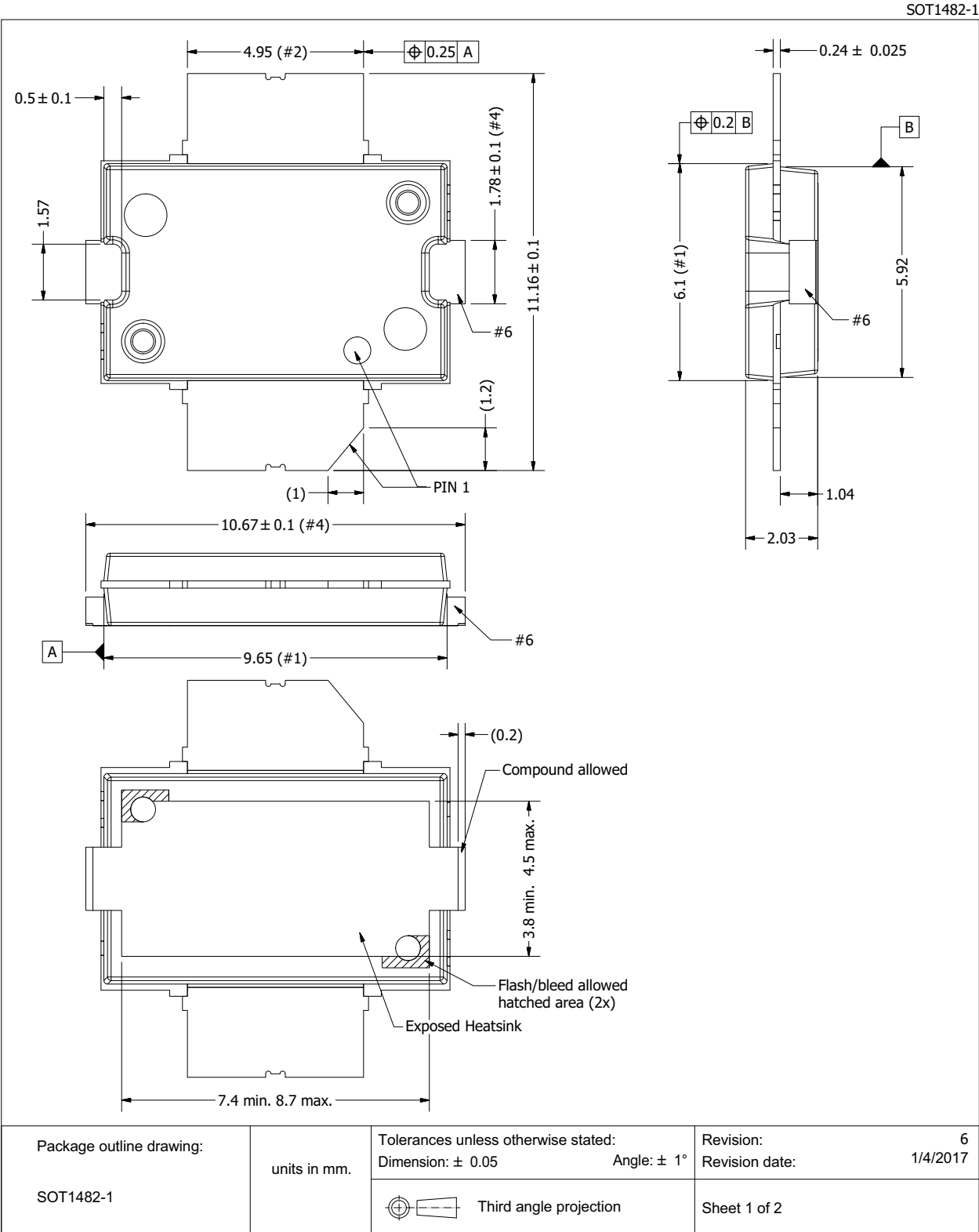


Fig 9. Package outline SOT1482-1 (sheet 1 of 2)

SOT1482-1

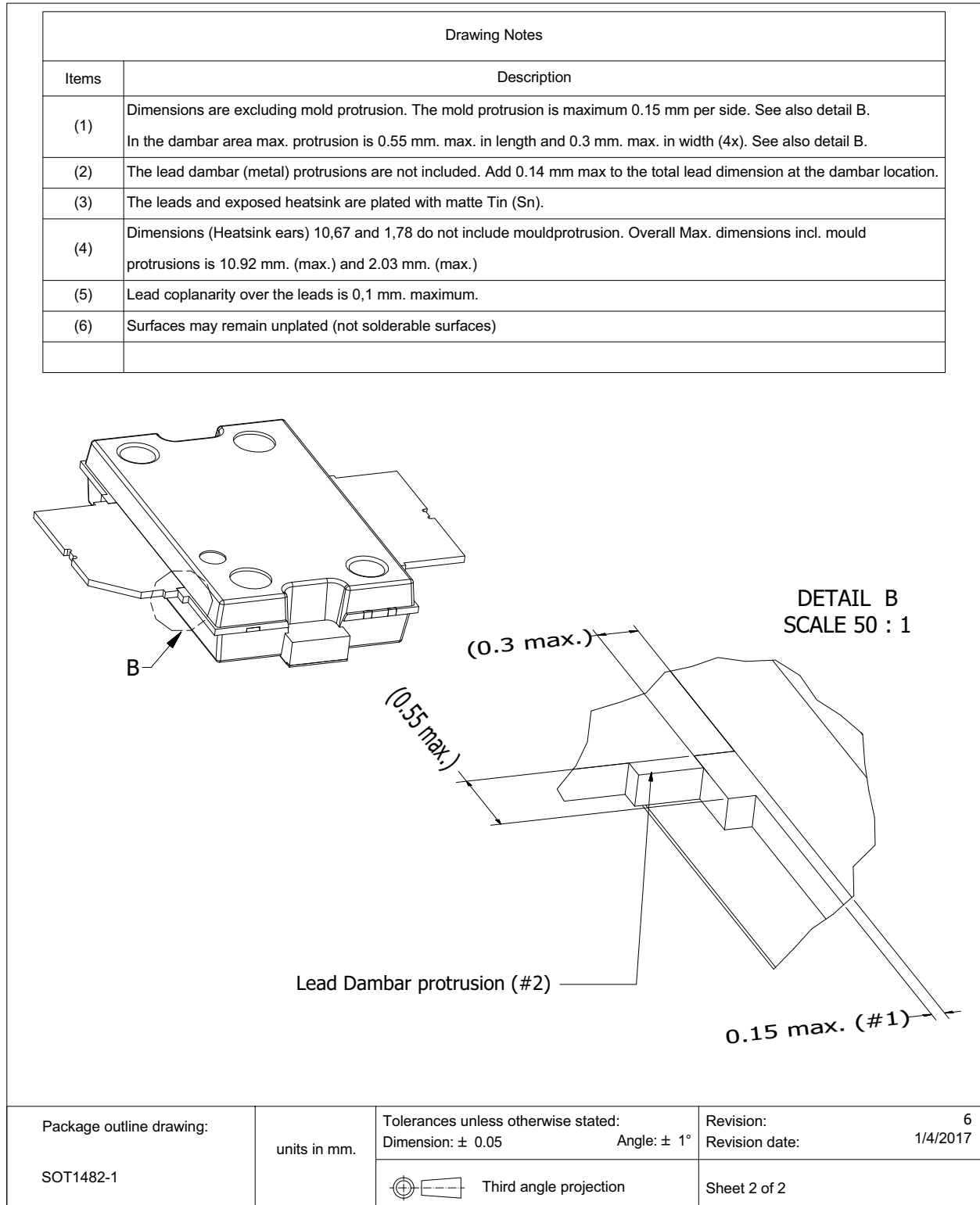


Fig 10. Package outline SOT1482-1 (sheet 2 of 2)

## 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	C2B <a href="#">[1]</a>
Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001	2 <a href="#">[2]</a>

[1] CDM classification C2B is granted to any part that passes after exposure to an ESD pulse of 750 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
DVB-T	Digital Video Broadcast - Terrestrial
ESD	ElectroStatic Discharge
HF	High Frequency
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
BLP15H9S100 v.3	20210708	Product data sheet	-	BLP15H9S100 v.2
Modifications:	<ul style="list-style-type: none"> <li><a href="#">Table 3 on page 2</a>: added orderable part number BLP15H9S100XY</li> </ul>			
BLP15H9S100 v.2	20201210	Product data sheet	-	BLP15H9S100 v.1
BLP15H9S100 v.1	20200807	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".

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