

BLP15M9S100

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 _L	G _p	η _D	RL _{in}
	(MHz)	(W)	(dB)	(%)	(dB)
pulsed CW	1400	100	16	68	-21

1.2 Features and benefits

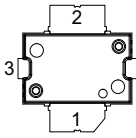
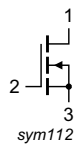
- High efficiency
- Integrated dual sided ESD protection
- Excellent ruggedness
- High power gain
- Excellent reliability
- Easy power control
- For RoHS compliance see the product details on the Ampleon website

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 ^[1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Package name	Orderable part number	12NC	Packing description	Min. orderable quantity (pieces)
TO-270-2F-1	BLP15M9S100Z	9349 602 42515	TR13; 500-fold; 24 mm; dry pack	500
	BLP15M9S100XY	9349 602 42538	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	^[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	$T_{case} = 85\text{ °C}; V_{DS} = 32\text{ V}; P_L = 100\text{ W}$	0.6	K/W

6. Characteristics

Table 6. DC characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 1\text{ mA}$	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	μA
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

$T_j = 25\text{ }^\circ\text{C}$; 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 $T_{case} = 25\text{ }^\circ\text{C}$; $V_{DS} = 32\text{ V}; I_{Dq} = 400\text{ mA}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Pulsed RF, class-AB						
G_p	power gain	$f = 1400\text{ MHz}; P_L = 100\text{ W}$	14.5	15.7	-	dB
η_D	drain efficiency	$f = 1400\text{ MHz}; P_L = 100\text{ W}$	64	68	-	%
RL_{in}	input return loss	$f = 1400\text{ MHz}; P_L = 100\text{ W}$	-	-19	-	dB

7. Test information

7.1 Ruggedness in class-AB operation

The BLP15M9S100 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

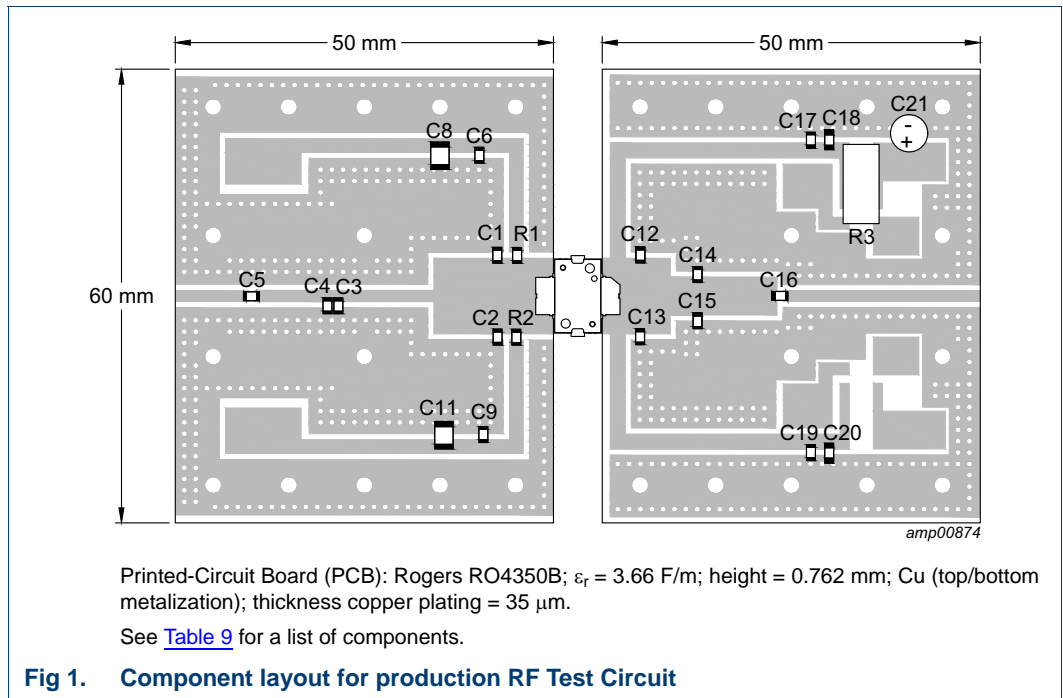
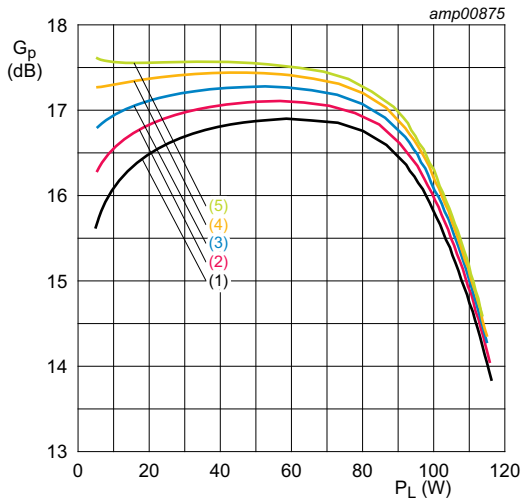


Table 9. List of components

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 μF , 63 V	
R1, R2	chip resistor	10 Ω	SMD 0805
R3	shunt resistor	10 m Ω	for current monitoring

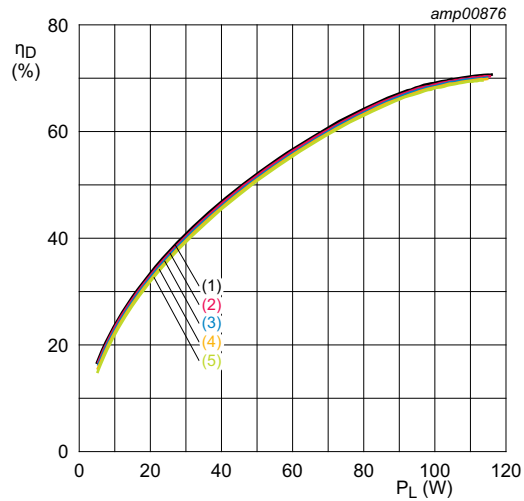
7.3 Graphical data



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

- (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) $I_{Dq} = 600\text{ mA}$

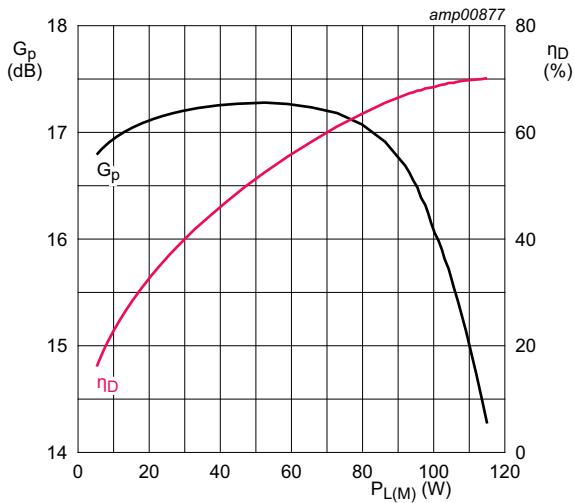
Fig 2. Power gain as a function of output power; typical values



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

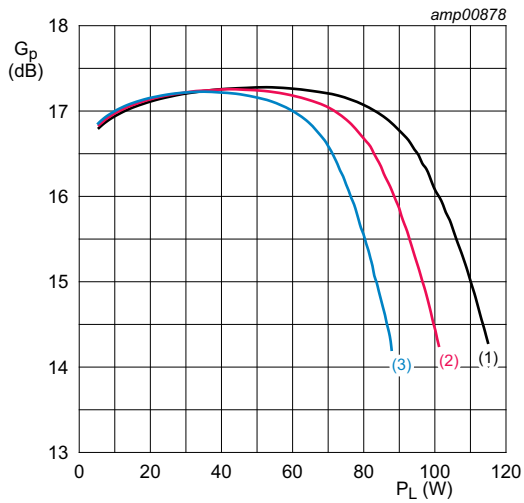
- (1) $I_{Dq} = 200\text{ mA}$
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- (3) $I_{Dq} = 400\text{ mA}$
- (4) $I_{Dq} = 500\text{ mA}$
- (5) $I_{Dq} = 600\text{ mA}$

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



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

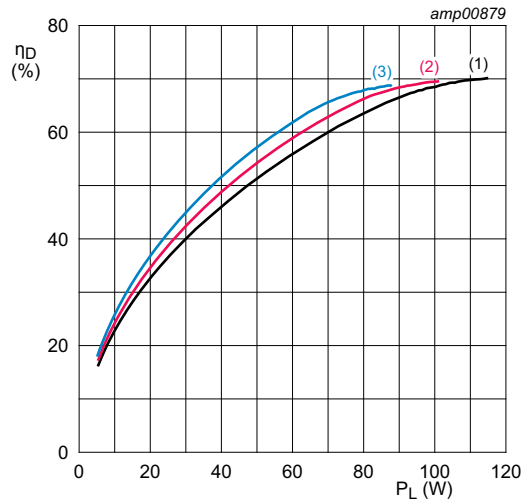
Fig 4. Power gain and drain efficiency as function of peak output power; typical values



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

- (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

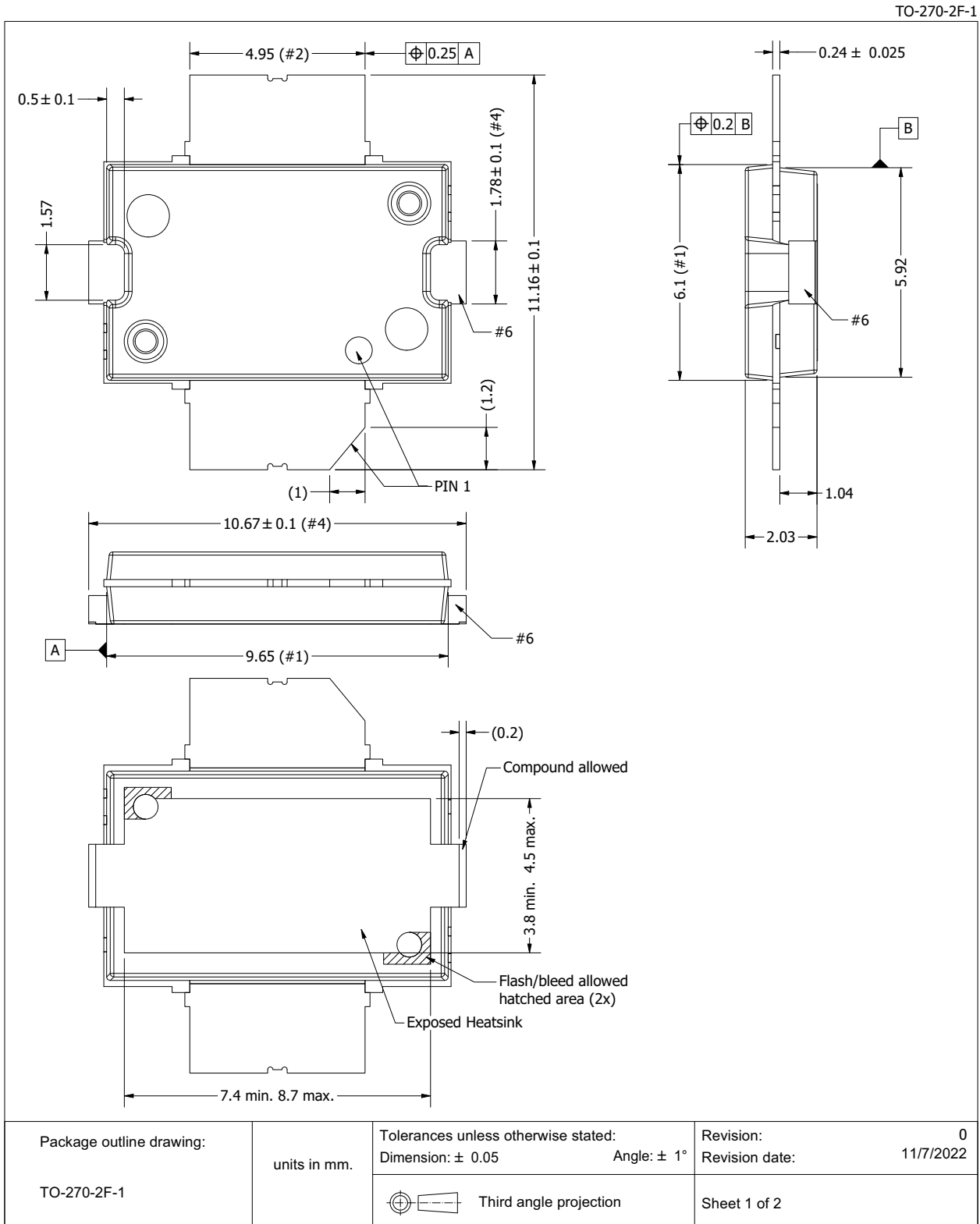


Fig 7. Package outline TO-270-2F-1 (sheet 1 of 2)

TO-270-2F-1

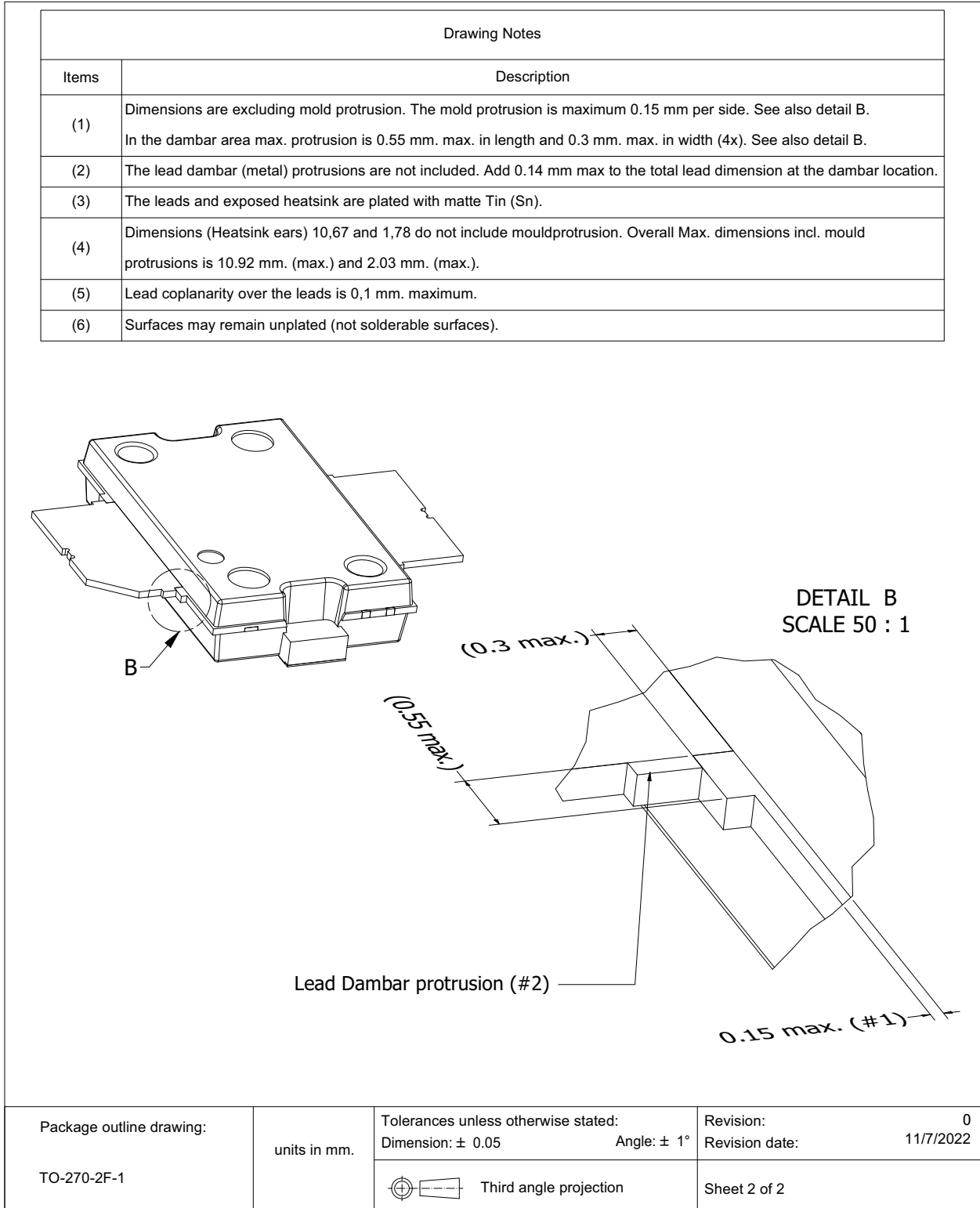


Fig 8. Package outline TO-270-2F-1 (sheet 2 of 2)

9. Handling information


CAUTION	
	<p>This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.</p> <p>Such precautions are described in the <i>ANSI/ESD S20.20</i>, <i>IEC/ST 61340-5</i>, <i>JESD625-A</i> or equivalent standards.</p>

Table 10. 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	2 [2]

[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
BLP15M9S100 v.4	20230112	Product data sheet	-	BLP15M9S100 v.3
Modifications:	<ul style="list-style-type: none"> Table 3 on page 2: package name changed from SOT1482-1 to TO-270-2F-1 Table 5 on page 2: value changed from 0.9 K/W to 0.6 K/W Section 8 on page 7: package outline drawing changed from SOT1482-1 to TO-270-2F-1 Section 12 on page 10: updated section 			
BLP15M9S100 v.3	20210716	Product data sheet	-	BLP15M9S100 v.2
BLP15M9S100 v.2	20210223	Product data sheet	-	BLP15M9S100 v.1
BLP15M9S100 v.1	20200831	Product data sheet	-	-

12. Legal information

12.1 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".

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