

BLP15M9S30; BLP15M9S30G

Power LDMOS transistor

AMPLEON

Rev. 4 — 12 January 2023

Product data sheet

1. Product profile

1.1 General description

A 30 W general purpose LDMOS RF power transistor for broadcast and ISM applications in HF to 2 GHz band.

Table 1. Application performance

Test signal	f	P _L	G _p	η _D	RL _{in}
	(MHz)	(W)	(dB)	(%)	(dB)
pulsed CW	1400	30	19.3	72	-17
CW	30 to 520	25	20	55	-3
	915	35	17	78	-22

1.2 Features and benefits

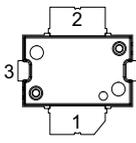
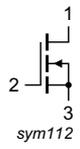
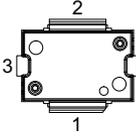
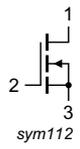
- High efficiency
- Integrated dual sided ESD protection
- Excellent ruggedness
- High power gain
- Excellent reliability
- Easy power control
- For RoHS compliance see the product details on the Ampleon website

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
BLP15M9S30 (TO-270-2F-1)			
1	drain		 sym112
2	gate		
3	source [1]		
BLP15M9S30G (TO-270-2G-1)			
1	drain		 sym112
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	BLP15M9S30Z	9349 602 46515	TR13; 500-fold; 24 mm; dry pack	500
	BLP15M9S30XY	9349 602 46538	TR7; 100-fold; 24 mm; dry pack	100
TO-270-2G-1	BLP15M9S30GZ	9349 602 45515	TR13; 500-fold; 24 mm; dry pack	500
	BLP15M9S30GXY	9349 602 45538	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		-6	+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	$T_{case} = 85\text{ °C}; V_{DS} = 32\text{ V}; P_L = 30\text{ W}$	1.9	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	$V_{GS} = 0\text{ V}; I_D = 0.33\text{ mA}$	65	70	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 33\text{ mA}$	1.5	2	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	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	6.2	-	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	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 1.16\text{ A}$	-	370	-	$\text{m}\Omega$

Table 7. AC characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 32\text{ V}; f = 1\text{ MHz}$	-	34.8	-	pF
C_{oss}	output capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 32\text{ V}; f = 1\text{ MHz}$	-	11.8	-	pF
C_{rss}	reverse transfer capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 32\text{ V}; f = 1\text{ MHz}$	-	0.39	-	pF

Table 8. RF characteristics

RF characteristics in Ampleon production test circuit; typical RF performance at $T_{case} = 25\text{ °C}; V_{DS} = 32\text{ V}; I_{Dq} = 200\text{ mA}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Pulsed RF, class-AB						
G_p	power gain	$f = 1400\text{ MHz}; P_L = 30\text{ W}$	16.5	19.3	-	dB
η_D	drain efficiency	$f = 1400\text{ MHz}; P_L = 30\text{ W}$	66	71	-	%
RL_{in}	input return loss	$f = 1400\text{ MHz}; P_L = 30\text{ W}$	-	-18	-	dB

7. Test information

7.1 Ruggedness in class-AB operation

The BLP15M9S30 and BLP15M9S30G are capable of withstanding a load mismatch corresponding to $VSWR = 10 : 1$ 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

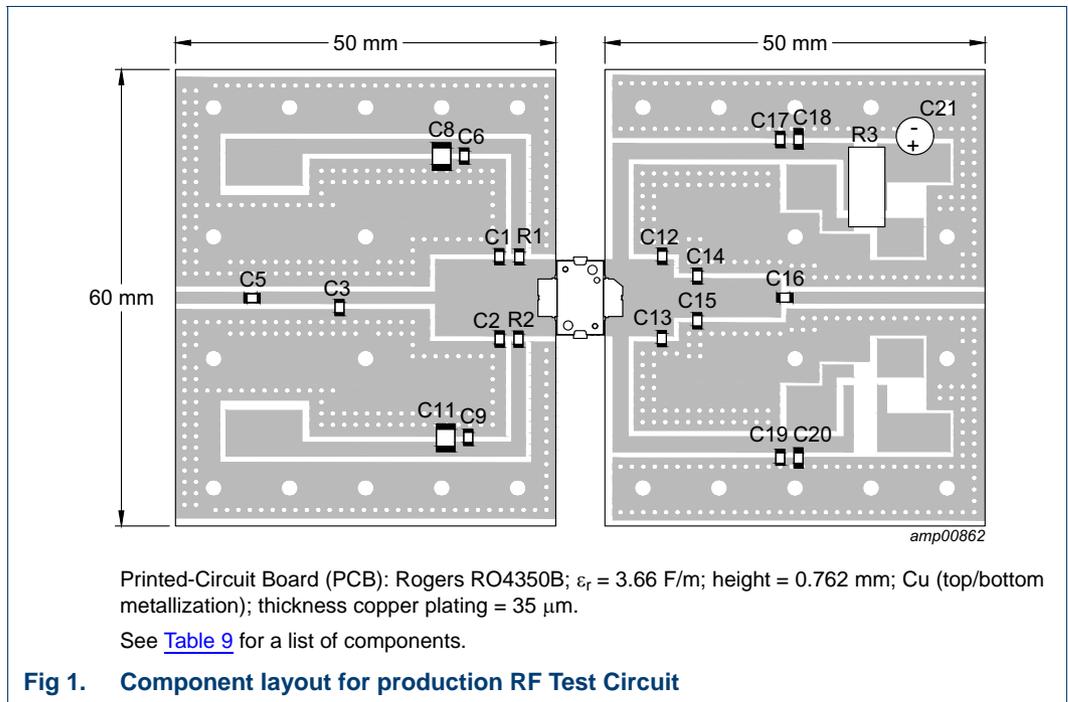
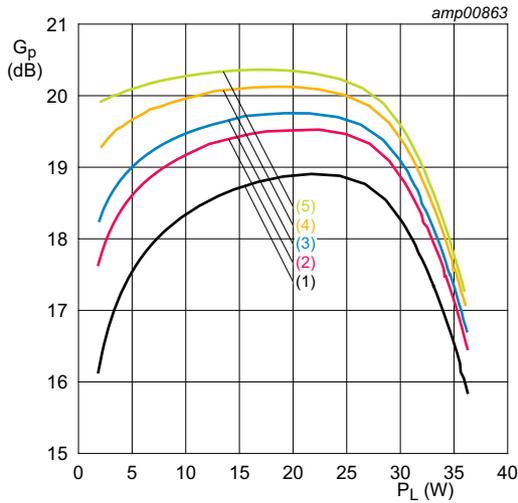


Table 9. List of components

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

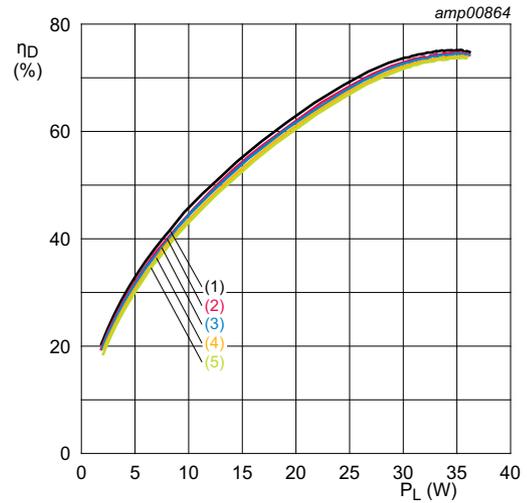
Component	Description	Value	Remarks
C1, C2, C12, C13	multilayer ceramic chip capacitor	6.2 pF	ATC 800A
C3	multilayer ceramic chip capacitor	2 pF	ATC 800A
C5, C6, C9, C17, C19, C16	multilayer ceramic chip capacitor	100 pF	ATC 800A
C8, C11, C18, C20	multilayer ceramic chip capacitor	100 nF, 100 V	
C14, 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



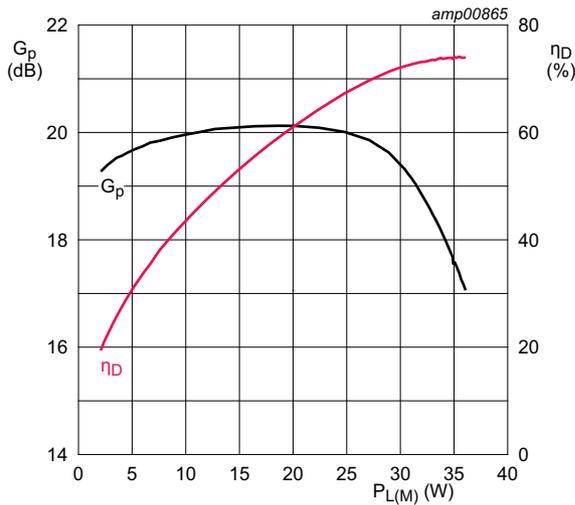
$V_{DS} = 32\text{ V}; f = 1400\text{ MHz}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$.
 (1) $I_{Dq} = 5\text{ mA}$
 (2) $I_{Dq} = 30\text{ mA}$
 (3) $I_{Dq} = 50\text{ mA}$
 (4) $I_{Dq} = 100\text{ mA}$
 (5) $I_{Dq} = 150\text{ mA}$

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



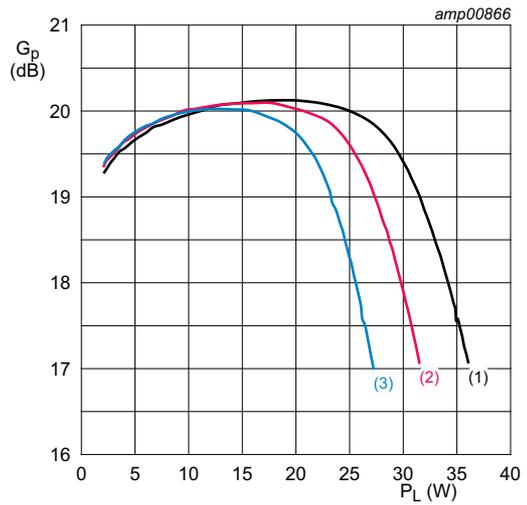
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 (4) $I_{Dq} = 100\text{ mA}$
 (5) $I_{Dq} = 150\text{ mA}$

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



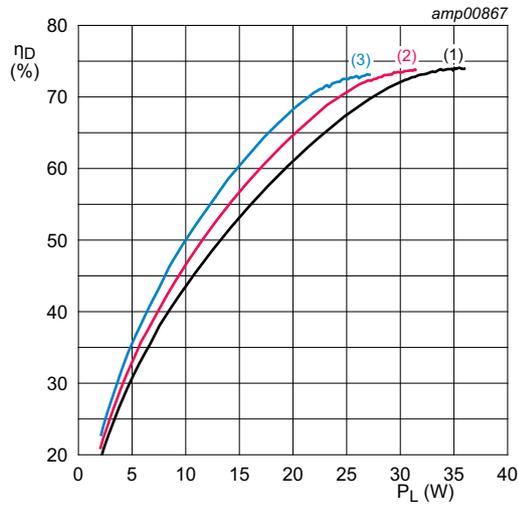
$V_{DS} = 32\text{ V}; I_{Dq} = 100\text{ mA}; f = 1400\text{ MHz}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$.

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



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



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

- (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

TO-270-2F-1

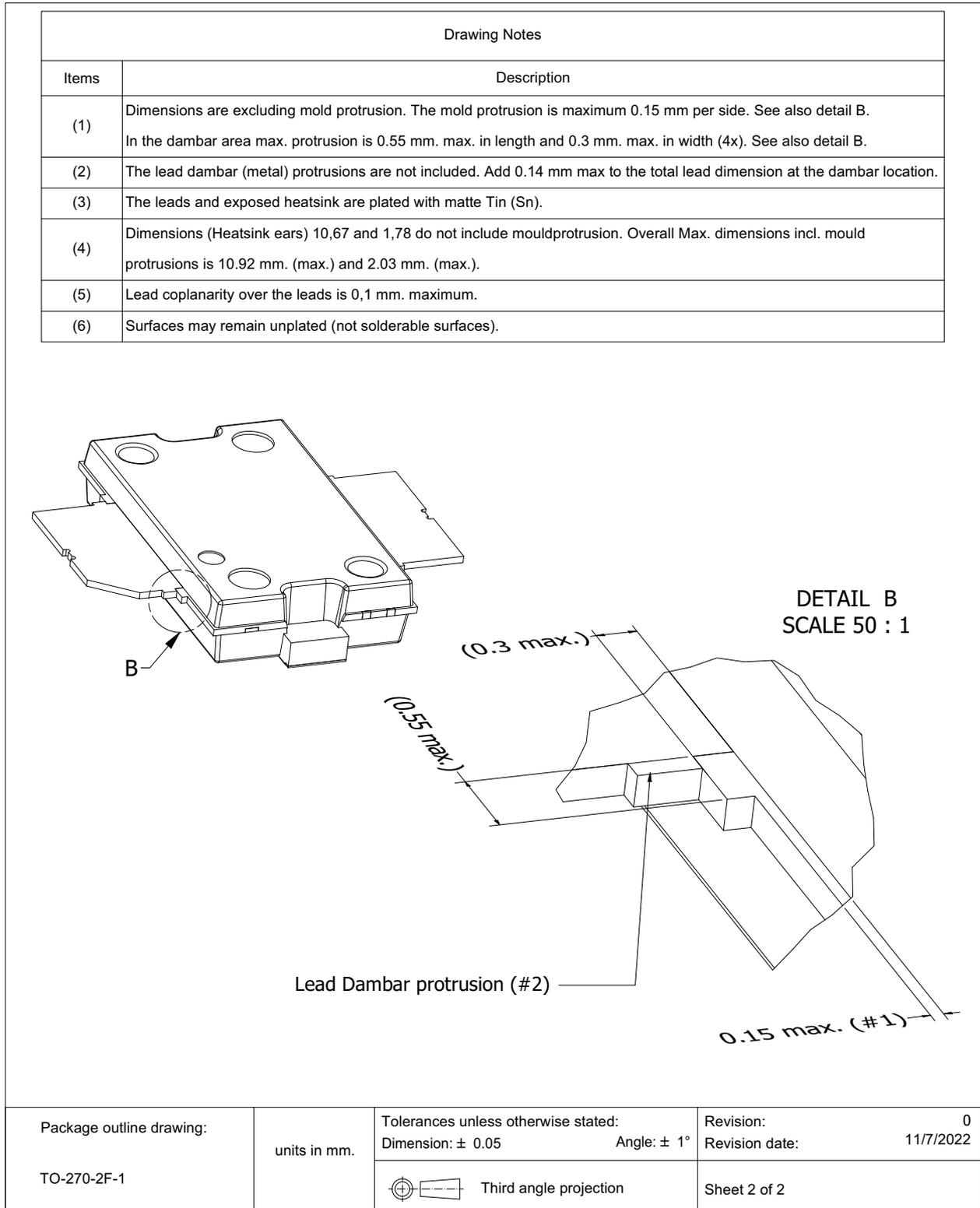


Fig 8. Package outline TO-270-2F-1 (sheet 2 of 2)

TO-270-2G-1

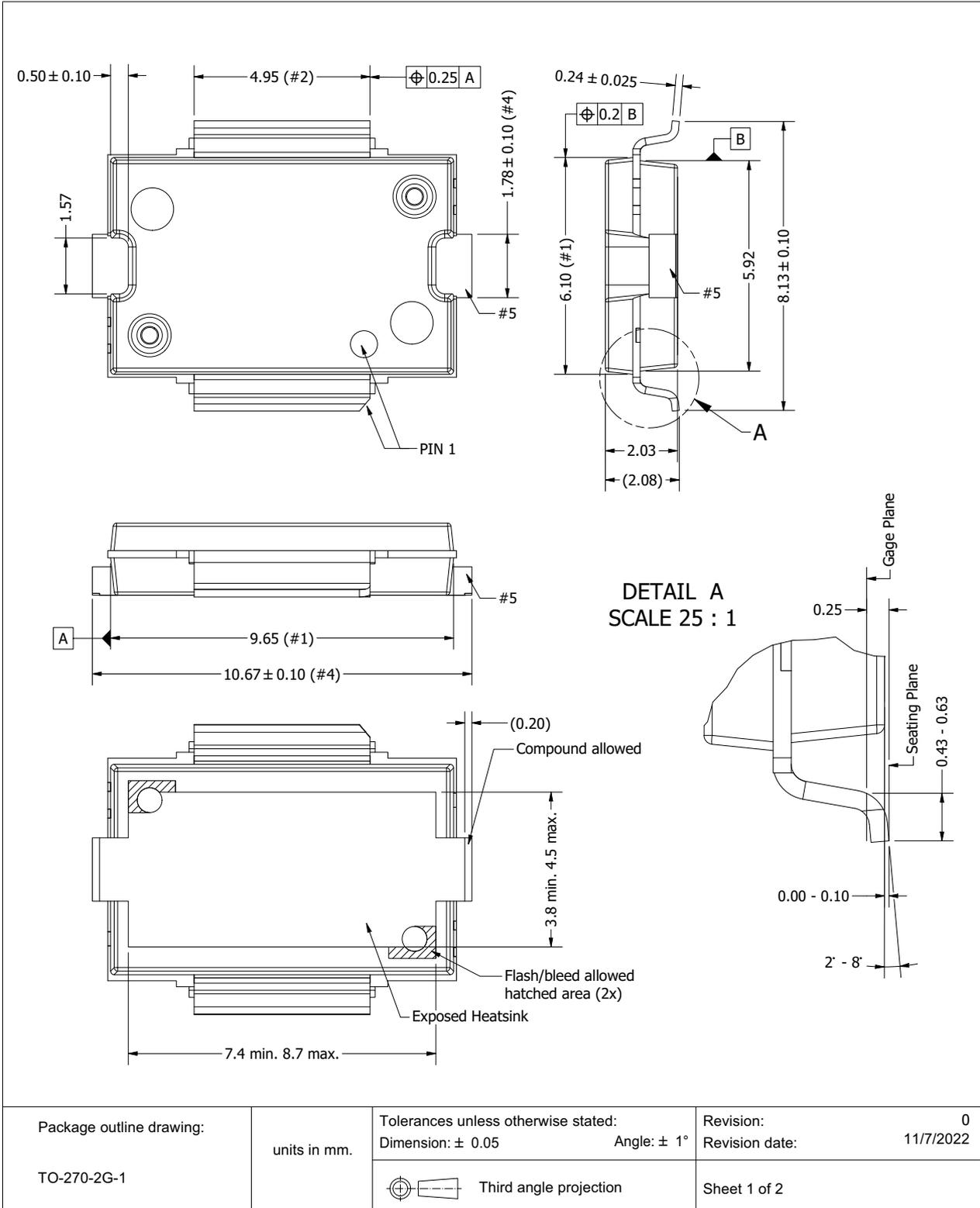


Fig 9. Package outline TO-270-2G-1 (sheet 1 of 2)

TO-270-2G-1

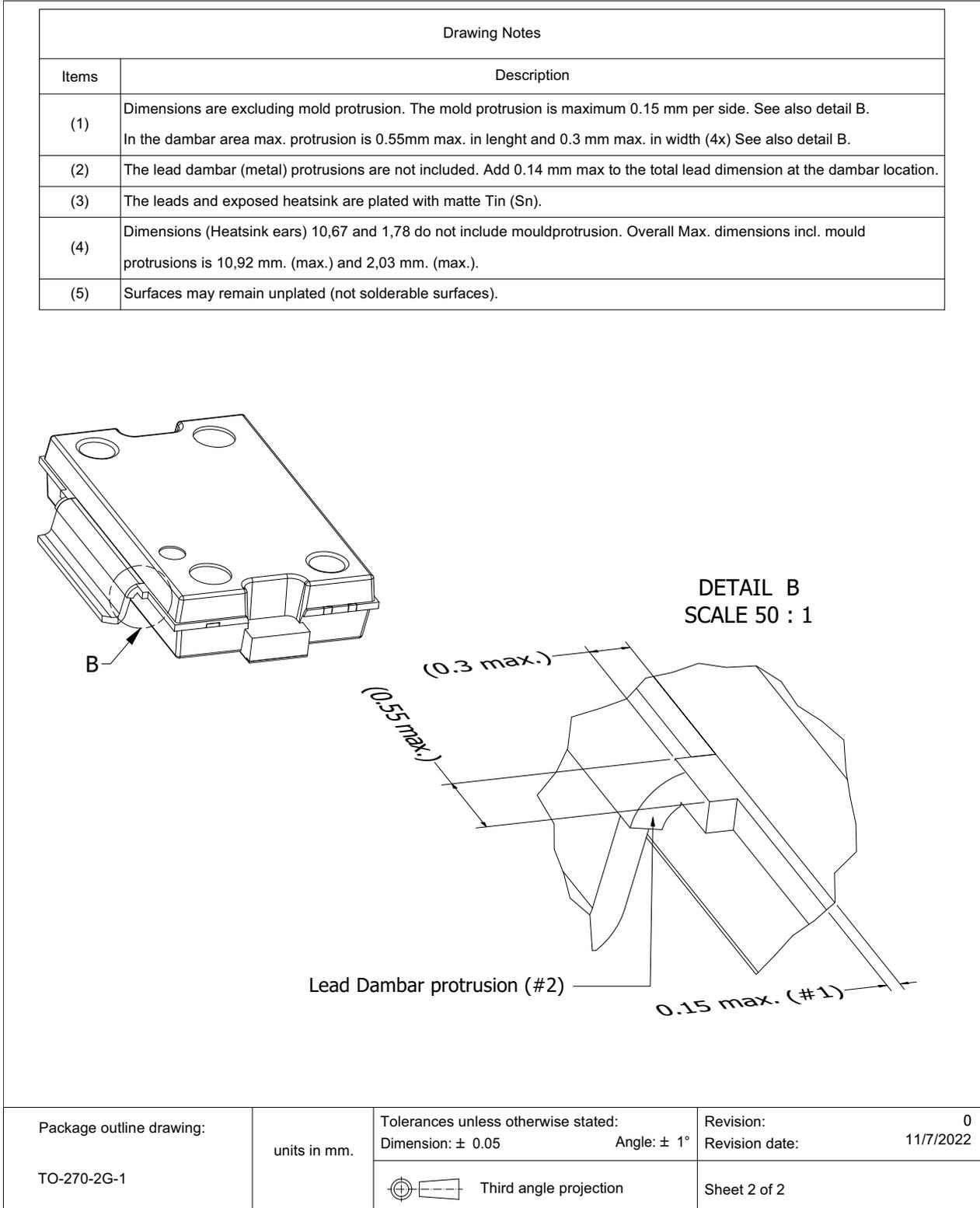


Fig 10. Package outline TO-270-2G-1 (sheet 2 of 2)

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 [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
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
BLP15M9S30_BLP15M9S30G v.4	20230112	Product data sheet	-	BLP15M9S30_BLP15M9S30G v.3
Modifications:	<ul style="list-style-type: none"> • Table 2 on page 2: package names changed from SOT1482-1 to TO-270-2F-1 and from SOT1483-1 to TO-270-2G-1 • Table 3 on page 2: package names changed from SOT1482-1 to TO-270-2F-1 and from SOT1483-1 to TO-270-2G-1 • Table 5 on page 3: value changed from 2.84 K/W to 1.9 K/W • Section 8 on page 7: package outline drawing changed from SOT1482-1 to TO-270-2F-1 and from SOT1483-1 to TO-270-2G-1 • Section 12 on page 13: updated section 			
BLP15M9S30_BLP15M9S30G v.3	20210716	Product data sheet	-	BLP15M9S30_BLP15M9S30G v.2
BLP15M9S30_BLP15M9S30G v.2	20210223	Product data sheet	-	BLP15M9S30_BLP15M9S30G v.1
BLP15M9S30_BLP15M9S30G v.1	20191015	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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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** 3

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** 11

10 **Abbreviations** 11

11 **Revision history** 12

12 **Legal information** 13

12.1 Data sheet status 13

12.2 Definitions 13

12.3 Disclaimers 13

12.4 Trademarks 14

13 **Contact information** 14

14 **Contents** 15

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