

BLP0408H9S30

Power LDMOS transistor

Rev. 3 — 12 January 2023

AMPLEON

Product data sheet

1. Product profile

1.1 General description

A 30 W LDMOS driver transistor for broadcast, class-AB transmitter and industrial applications. The excellent ruggedness of this device makes it ideal for digital and analog transmitter applications in the frequency range from 400 MHz to 860 MHz.

Table 1. Typical performance

RF performance at $I_{Dq} = 60$ mA in an application circuit.

Test signal	f (MHz)	V _{DS} (V)	P _L (W)	G _p (dB)	η _D (%)
pulsed CW [1]	714	50	30	20.2	62
DVB-T (8k OFDM)	714	50	6	20.0	32

[1] Measured at $\delta = 20$ %; $t_p = 100$ μ s.

1.2 Features and benefits

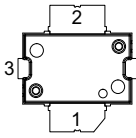
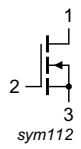
- Designed for broadband operation
- High efficiency
- Integrated dual sided ESD protection
- Excellent ruggedness
- High power gain
- Excellent reliability
- Easy power control
- Excellent stability
- For RoHS compliance see the product details on the Ampleon website

1.3 Applications

- Broadcast transmitter applications in the UHF band
- Digital and analog broadcasting
- Industrial, scientific and medical applications
- Applicable at frequencies from 400 MHz to 860 MHz

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	BLP0408H9S30Z	9349 602 54515	TR13; 500-fold; 24 mm; dry pack	500
	BLP0408H9S30XY	9349 602 54538	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		-	108	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	$T_{case} = 80\text{ °C}$	1.7	K/W

6. Characteristics

Table 6. DC characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 0.18\text{ mA}$	108	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 18\text{ mA}$	1.5	1.9	2.5	V
V_{GSq}	gate-source quiescent voltage	$V_{DS} = 50\text{ V}; I_D = 60\text{ mA}$	1.6	2.0	2.6	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V}$	-	-	1.4	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	3.1	-	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	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 0.63\text{ A}$	-	1.2	-	Ω

Table 7. AC characteristics

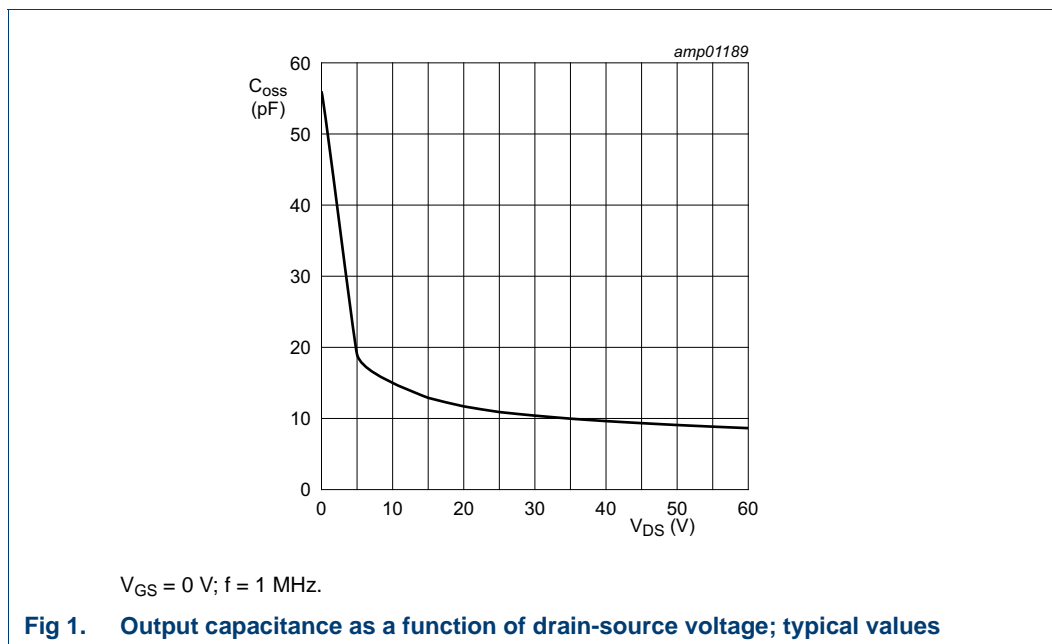
$T_j = 25\text{ }^\circ\text{C}$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_{iss}	input capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V}; f = 1\text{ MHz}$	-	112	-	pF
C_{oss}	output capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V}; f = 1\text{ MHz}$	-	9.1	-	pF
C_{rss}	reverse transfer capacitance	$V_{GS} = 0\text{ V}; V_{DS} = 50\text{ V}; f = 1\text{ MHz}$	-	0.24	-	pF

Table 8. RF characteristics

Test signal: pulsed CW; $t_p = 100\text{ }\mu\text{s}$; $\delta = 20\%$; $f = 714\text{ MHz}$; RF performance at $V_{DS} = 50\text{ V}$; $I_{Dq} = 60\text{ mA}$; $T_{case} = 25\text{ }^\circ\text{C}$; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	$P_L = 30\text{ W}$	18.5	20.2	-	dB
RL_{in}	input return loss	$P_L = 30\text{ W}$	-	-12	-9	dB
η_D	drain efficiency	$P_L = 30\text{ W}$	59	62	-	%



7. Test information

7.1 Ruggedness in class-AB operation

The BLP0408H9S30 is capable of withstanding a load mismatch corresponding to VSWR = 30 : 1 through all phases under the following conditions: V_{DS} = 50 V; I_{Dq} = 60 mA; P_L = 30 W; f = 714 MHz; pulsed CW (t_p = 100 μs; δ = 20 %).

7.2 Test circuit

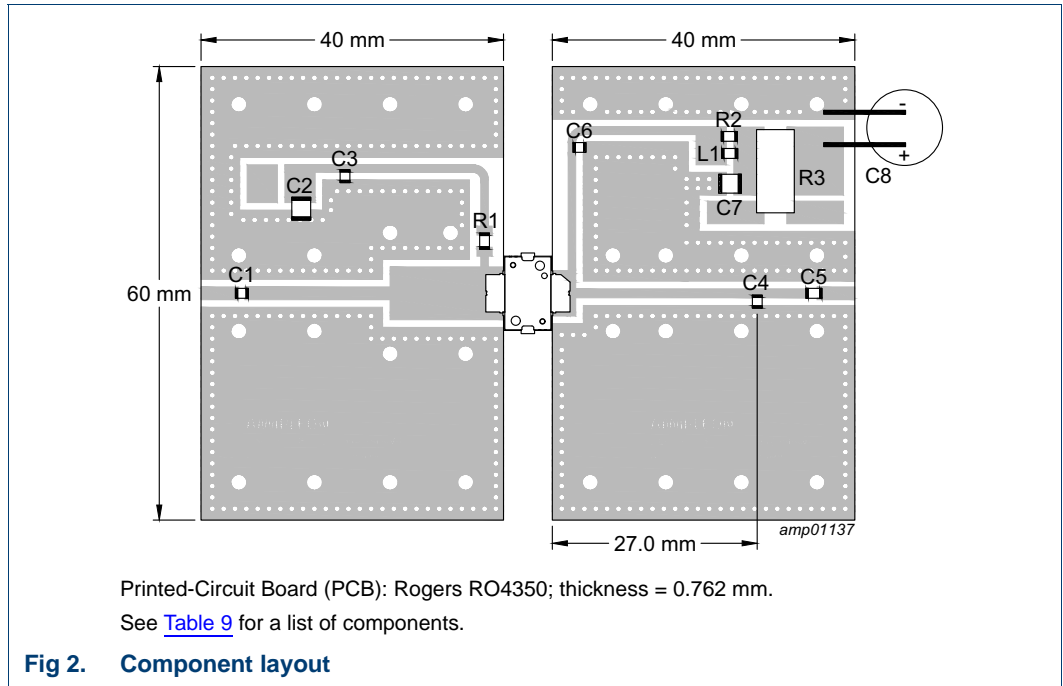


Table 9. List of components

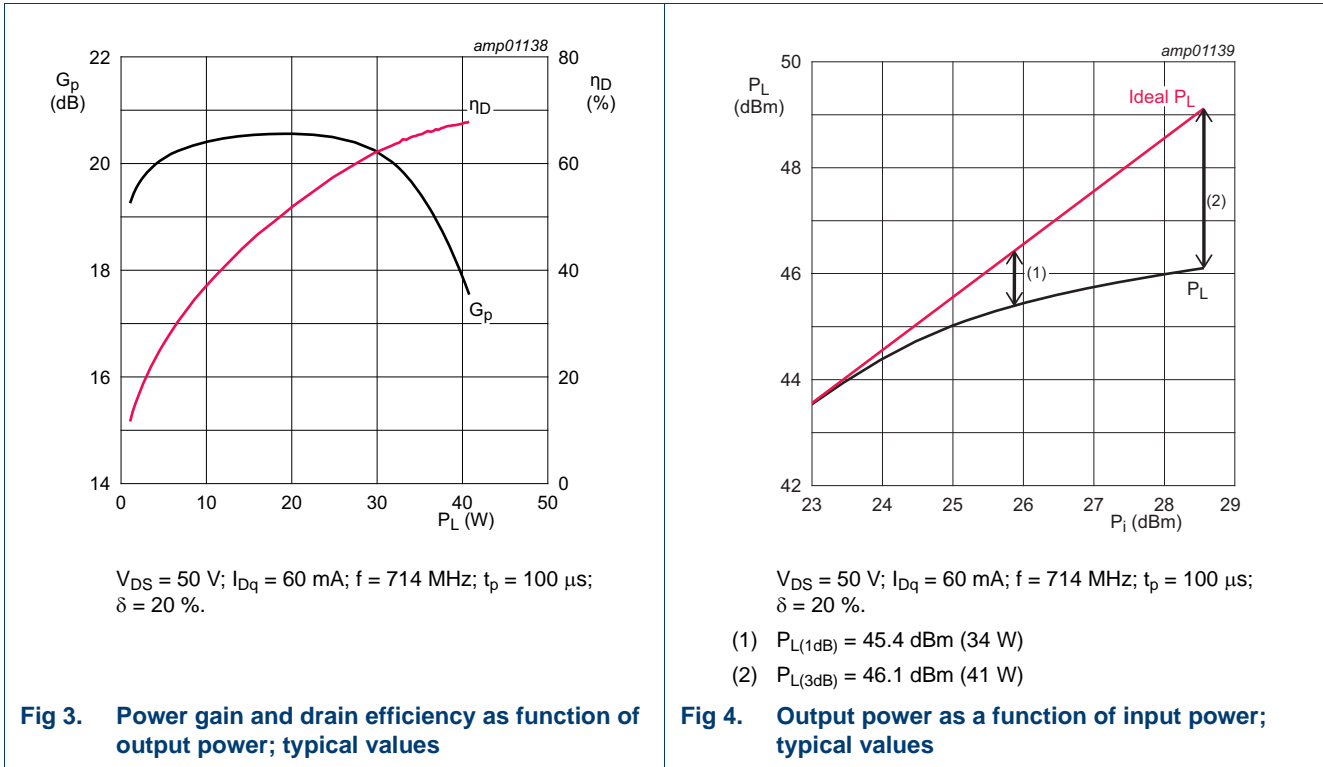
For test circuit see [Figure 2](#).

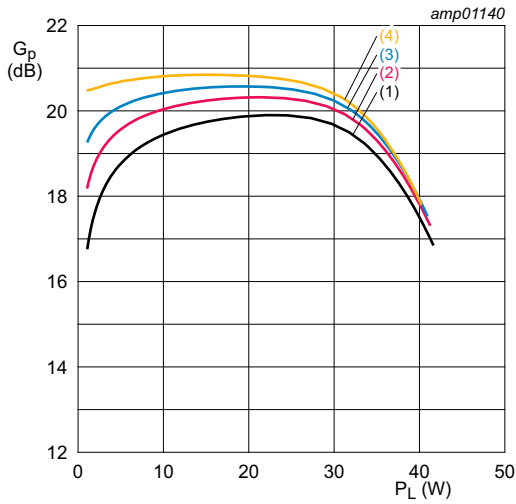
Component	Description	Value	Remarks
C1, C3, C5, C6	multilayer ceramic chip capacitor	100 pF [1]	
C2, C7	multilayer ceramic chip capacitor	4.7 μF, 100 V	
C4	multilayer ceramic chip capacitor	3.6 pF [1]	
C8	electrolytic capacitor	470 μF, 64 V	
L1	inductor	9 nH	Coilcraft: 1508-9N0GLB
R1	chip resistor	4.7 kΩ	SMD 1206
R2	chip resistor	10 Ω	SMD 1206
R3	shunt resistor	10 mΩ	current monitoring

[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

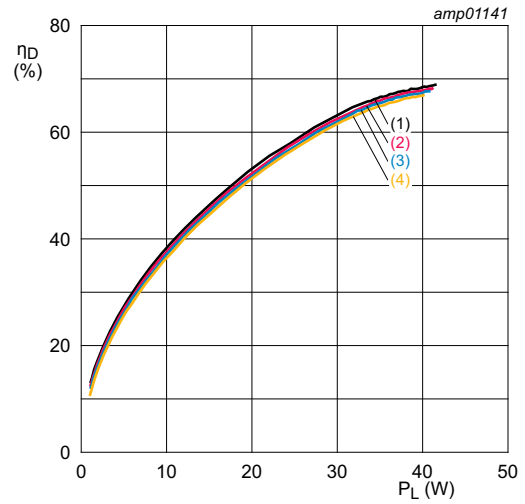




$V_{DS} = 50\text{ V}$; $f = 714\text{ MHz}$; $t_p = 100\text{ }\mu\text{s}$; $\delta = 20\text{ }\%$.

- (1) $I_{Dq} = 10\text{ mA}$
- (2) $I_{Dq} = 20\text{ mA}$
- (3) $I_{Dq} = 60\text{ mA}$
- (4) $I_{Dq} = 100\text{ mA}$

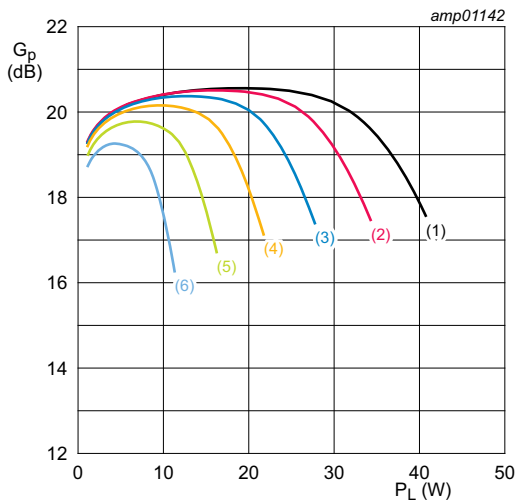
Fig 5. Power gain as a function of output power; typical values



$V_{DS} = 50\text{ V}$; $f = 714\text{ MHz}$; $t_p = 100\text{ }\mu\text{s}$; $\delta = 20\text{ }\%$.

- (1) $I_{Dq} = 10\text{ mA}$
- (2) $I_{Dq} = 20\text{ mA}$
- (3) $I_{Dq} = 60\text{ mA}$
- (4) $I_{Dq} = 100\text{ mA}$

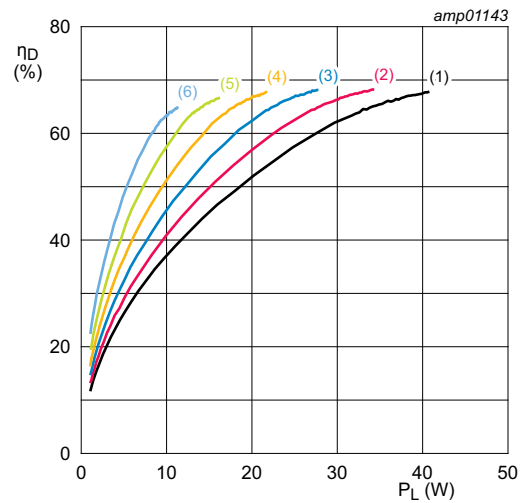
Fig 6. Drain efficiency as a function of output power; typical values



$I_{Dq} = 60\text{ mA}$; $f = 714\text{ MHz}$; $t_p = 100\text{ }\mu\text{s}$; $\delta = 20\text{ }\%$.

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

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



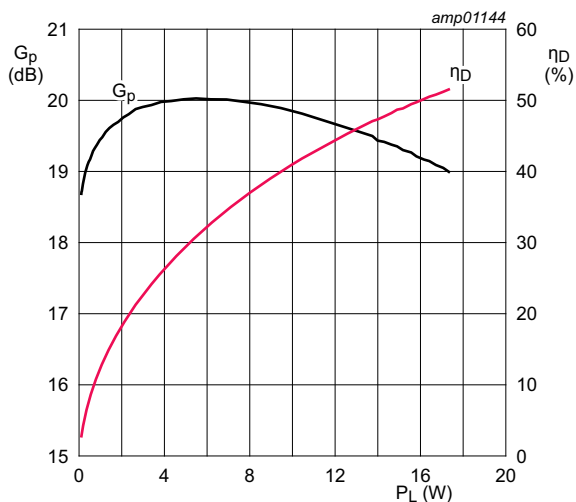
$I_{Dq} = 60\text{ mA}$; $f = 714\text{ MHz}$; $t_p = 100\text{ }\mu\text{s}$; $\delta = 20\text{ }\%$.

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

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

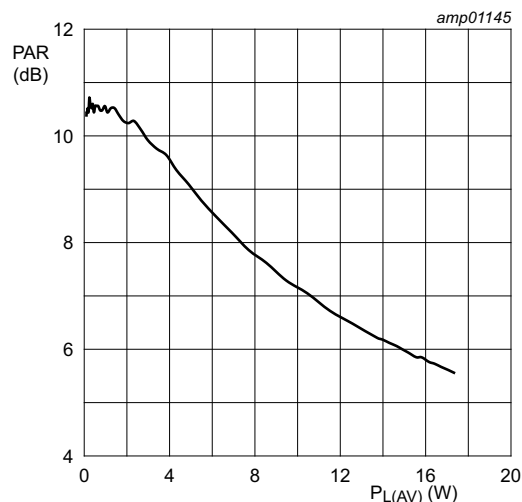
7.3.2 DVB-T performance measured in production RF test circuit

PAR (of output signal) at 0.01 % probability on CCDF; PAR of input signal = 9.5 dB at 0.01 % probability on CCDF.



V_{DS} = 50 V; I_{Dq} = 60 mA; f = 714 MHz.

Fig 9. Power gain and drain efficiency as function of output power; typical values



V_{DS} = 50 V; I_{Dq} = 60 mA; f = 714 MHz.

Fig 10. Peak-to-average power ratio as a function of output power; typical values

TO-270-2F-1

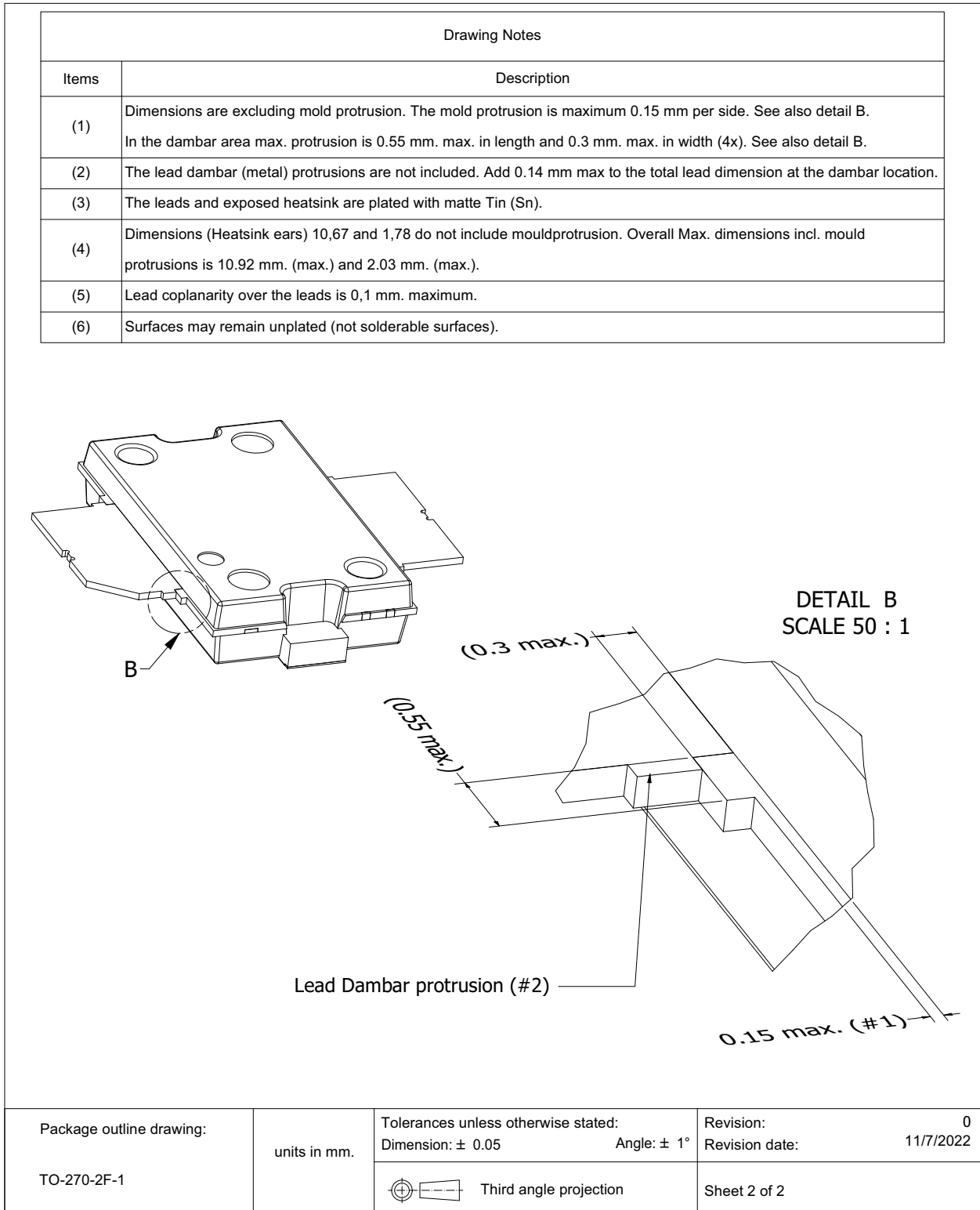


Fig 12. Package outline TO-270-2F-1 (sheet 2 of 2)

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 [1]
Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001	2 [2]

[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
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DVB-T	Digital Video Broadcast - Terrestrial
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
MTF	Median Time to Failure
OFDM	Orthogonal Frequency Division Multiplexing
PAR	Peak-to-Average Ratio
RoHS	Restriction of Hazardous Substances
SMD	Surface Mounted Device
UHF	Ultra High Frequency
VSWR	Voltage Standing Wave Ratio

11. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLP0408H9S30 v.3	20230112	Product data sheet		BLP0408H9S30 v.2
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 2.30 K/W to 1.7 K/W Section 8 on page 9: package outline drawing changed from SOT1482-1 to TO-270-2F-1 Section 12 on page 12: updated section 			
BLP0408H9S30 v.2	20210716	Product data sheet		BLP0408H9S30 v.1
BLP0408H9S30 v.1	20191205	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".

[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>.

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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	2
6	Characteristics	3
7	Test information	4
7.1	Ruggedness in class-AB operation	4
7.2	Test circuit	5
7.3	Graphical data	6
7.3.1	Pulsed CW performance measured in production RF test circuit	6
7.3.2	DVB-T performance measured in production RF test circuit	8
8	Package outline	9
9	Handling information	11
10	Abbreviations	11
11	Revision history	11
12	Legal information	12
12.1	Data sheet status	12
12.2	Definitions	12
12.3	Disclaimers	12
12.4	Licenses	13
12.5	Trademarks	13
13	Contact information	13
14	Contents	14

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Date of release: 12 January 2023
 Document identifier: BLP0408H9S30