BPF0910H9X600

Power LDMOS module

Rev. 1 — 26 March 2020

AMPLEON

Product data sheet

1. Product profile

1.1 General description

600 W LDMOS power module for Industrial, Scientific and Medical (ISM) applications at frequencies from 902 MHz to 928 MHz. The module is designed for high-power CW applications.

Table 1. Test information

Typical RF performance at V_{DS} = 50 V; T_{mb} = 25 °C; I_{Dq} = 90 mA.

Test signal	f	V_{DS}	P_L	G_p	η_D
	(MHz)	(V)	(W)	(dB)	(%)
CW	915	50	600	18	68

1.2 Features and benefits

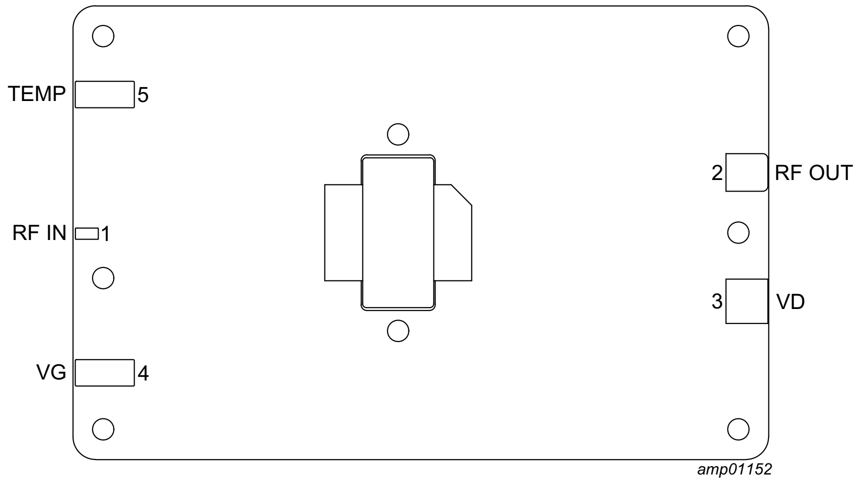
- High efficiency
- Small size: 92 × 60 mm
- Input/output 50 Ω matched
- Designed for broadband operation (902 MHz to 928 MHz)
- Built-in temperature sensor
- Built-in temperature compensation networks
- 100 % RF testing in production
- For RoHS compliance see the product details on the Ampleon website

1.3 Applications

- RF power amplifiers for CW applications in the 902 MHz to 928 MHz frequency range such as industrial heating and drying, scientific, medical

2. Pinning information

2.1 Pinning



Top view.

Fig 1. Pin configuration

2.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
RF IN	1	RF input
RF OUT	2	RF output
VD	3	drain-source voltage
VG	4	gate-source voltage
TEMP	5	temperature sensor

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BPF0910H9X600	-	pallet; 8 mounting holes; 5 terminations	-

4. Block diagram

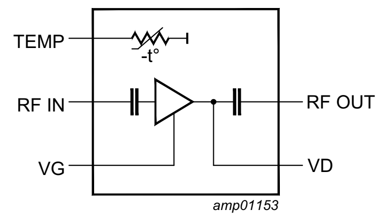


Fig 2. Block diagram

5. 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	non operating	0	106	V
V_{GS}	gate-source voltage	non operating	–6	+11	V
T_{stg}	storage temperature		–65	+85	°C
T_{mb}	mounting base temperature	[1]	0	65	°C

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

6. Characteristics

Table 5. DC characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0 V; I_D = 4 mA	106	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 50 V; I_D = 90 mA	-	1.8	-	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 50 V	-	-	2.8	μA
R_{GS}	gate-source resistance		400	1750	6200	Ω
C_{iss}	input capacitance	VG pin	-	4.7	-	μF
		VD pin	-	4.7	-	μF

Table 6. RF Characteristics

Test signal: CW; f = 915 MHz; RF performance at T_{mb} = 25 °C; V_{DS} = 50 V; I_{Dq} = 90 mA; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	P_L = 600 W	17.0	19.0	-	dB
$P_{L(1dB)}$	output power at 1 dB gain compression		-	550	-	W
$P_{L(3dB)}$	output power at 3 dB gain compression		-	600	-	W
G_{flat}	gain flatness	P_L = 600 W	-	1	-	dB
RL_{in}	input return loss	P_L = 600 W	-	–18	–7	dB
η_D	drain efficiency	P_L = 600 W	65	69	-	%
$\alpha_{sup(H)}$	harmonic suppression	P_L = 600 W	-	27	-	dBc

6.1 Ruggedness in class-AB operation

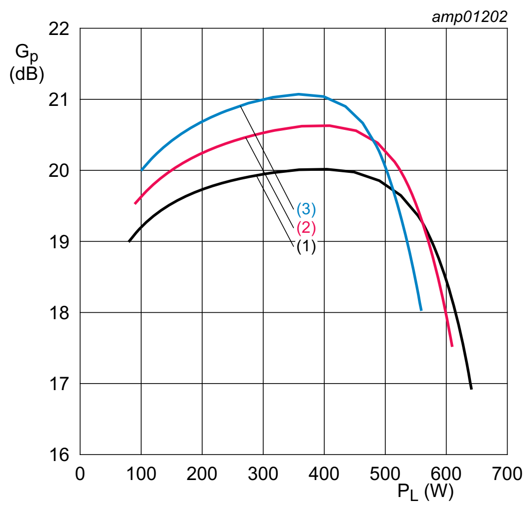
The BPF0910H9X600 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 50 V; I_{Dq} = 90 mA; P_L = 600 W (CW); f = 915 MHz; T_{mb} = 25 °C; tested with soft power ramp [1] up across predefined integer phase steps.

[1] Device switched on at P_L = 300 W, then increased to 600 W, kept at 600 W for a few seconds then decreased to 300 W and switched off.

7. Test information

7.1 Graphical data

7.1.1 CW



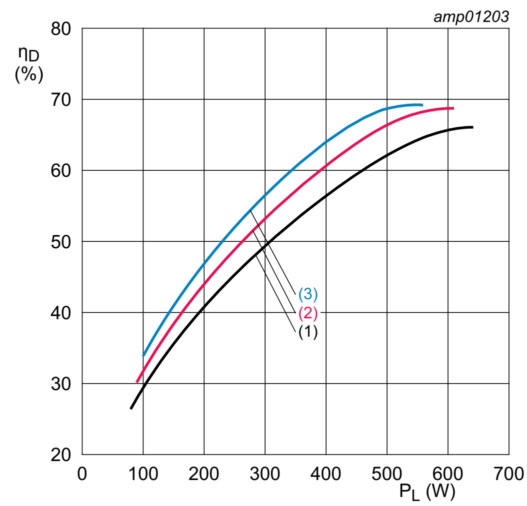
I_{Dq} = 90 mA; V_{DS} = 50 V; T_{mb} = 25 °C.

(1) f = 902 MHz

(2) f = 915 MHz

(3) f = 928 MHz

Fig 3. Power gain as a function of output power; typical values



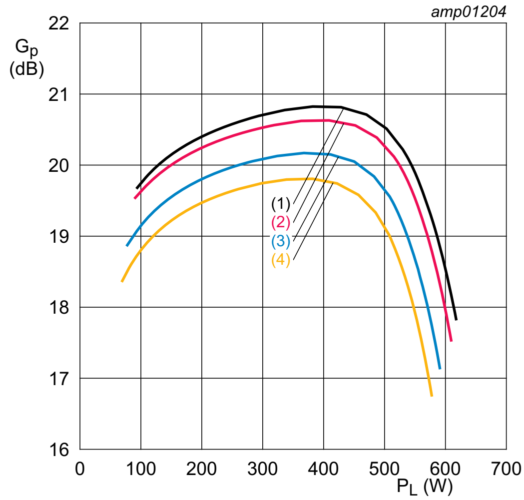
I_{Dq} = 90 mA; V_{DS} = 50 V; T_{mb} = 25 °C.

(1) f = 902 MHz

(2) f = 915 MHz

(3) f = 928 MHz

Fig 4. Drain efficiency as a function of output power; typical values



I_{Dq} = 90 mA; V_{DS} = 50 V; f = 915 MHz.

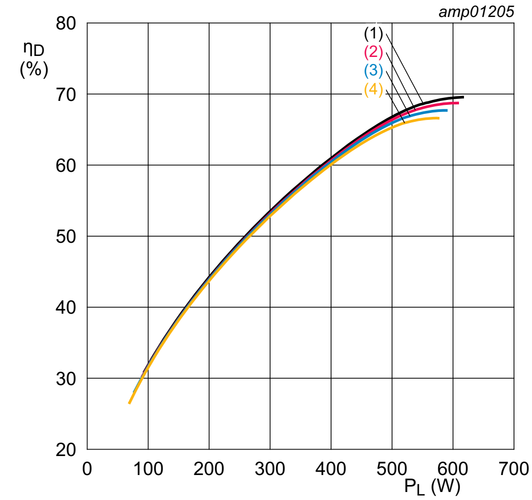
(1) T_{mb} = 5 °C

(2) T_{mb} = 25 °C

(3) T_{mb} = 45 °C

(4) T_{mb} = 65 °C

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



I_{Dq} = 90 mA; V_{DS} = 50 V; f = 915 MHz.

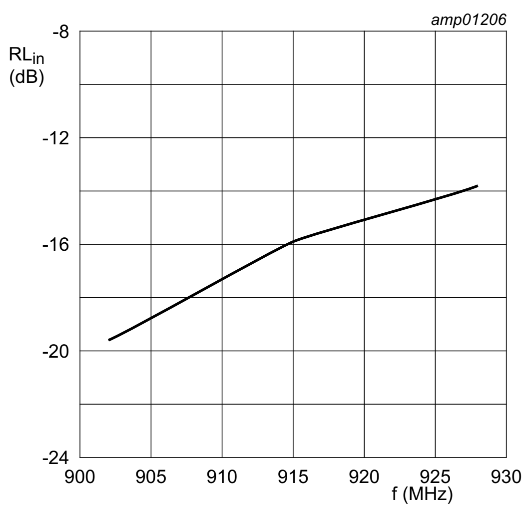
(1) T_{mb} = 5 °C

(2) T_{mb} = 25 °C

(3) T_{mb} = 45 °C

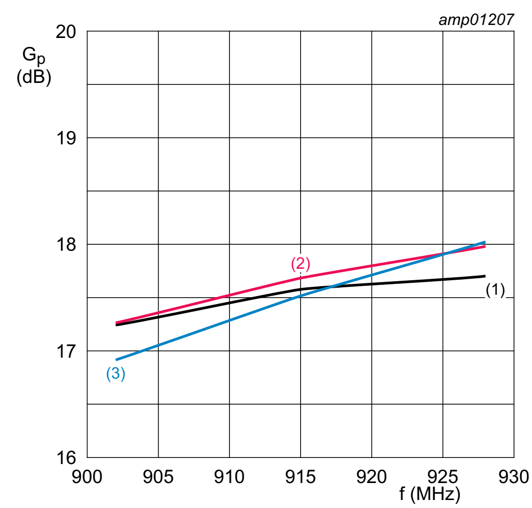
(4) T_{mb} = 65 °C

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



I_{Dq} = 90 mA; V_{DS} = 50 V; P_L = 600 W; T_{mb} = 25 °C.

Fig 7. Input return loss as a function of frequency; typical values



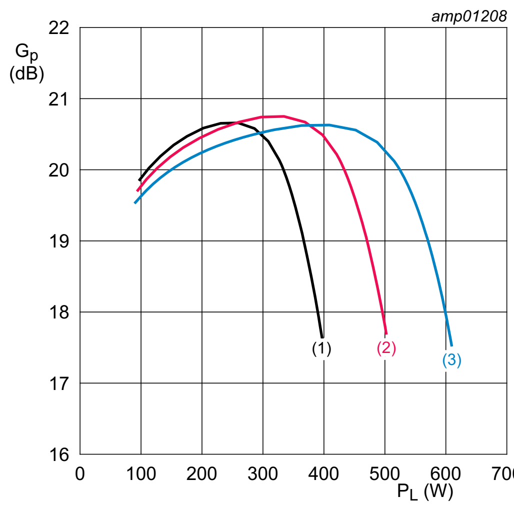
I_{Dq} = 90 mA; T_{mb} = 25 °C.

(1) V_{DS} = 40 V; P_L = 400 W

(2) V_{DS} = 45 V; P_L = 500 W

(3) V_{DS} = 50 V; P_L = 600 W

Fig 8. Power gain as a function of frequency; typical values



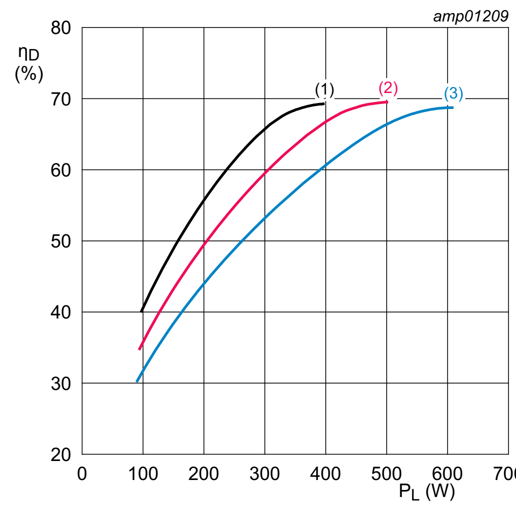
I_{Dq} = 90 mA; T_{mb} = 25 °C.

(1) V_{DS} = 40 V

(2) V_{DS} = 45 V

(3) V_{DS} = 50 V

Fig 9. Power gain as a function of output power; typical values



I_{Dq} = 90 mA; T_{mb} = 25 °C.

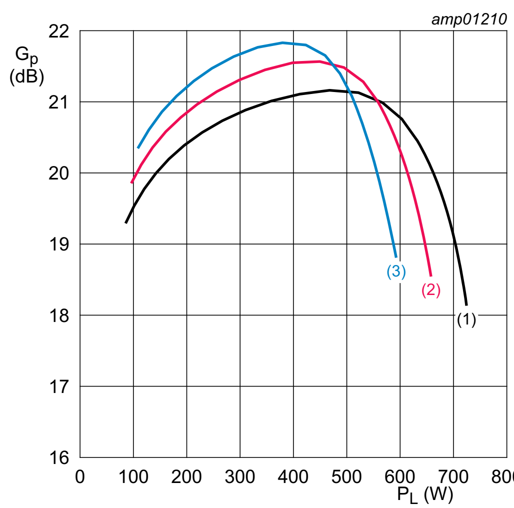
(1) V_{DS} = 40 V

(2) V_{DS} = 45 V

(3) V_{DS} = 50 V

Fig 10. Drain efficiency as a function of output power; typical values

7.1.2 CW pulsed



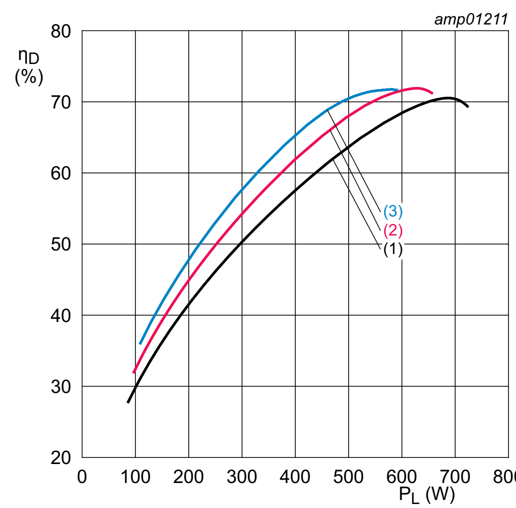
I_{Dq} = 90 mA; V_{DS} = 50 V; T_{mb} = 25 °C; t_p = 100 µs; δ = 10 %.

(1) f = 902 MHz

(2) f = 915 MHz

(3) f = 928 MHz

Fig 11. Power gain as a function of output power; typical values



I_{Dq} = 90 mA; V_{DS} = 50 V; T_{mb} = 25 °C; t_p = 100 µs; δ = 10 %.

(1) f = 902 MHz

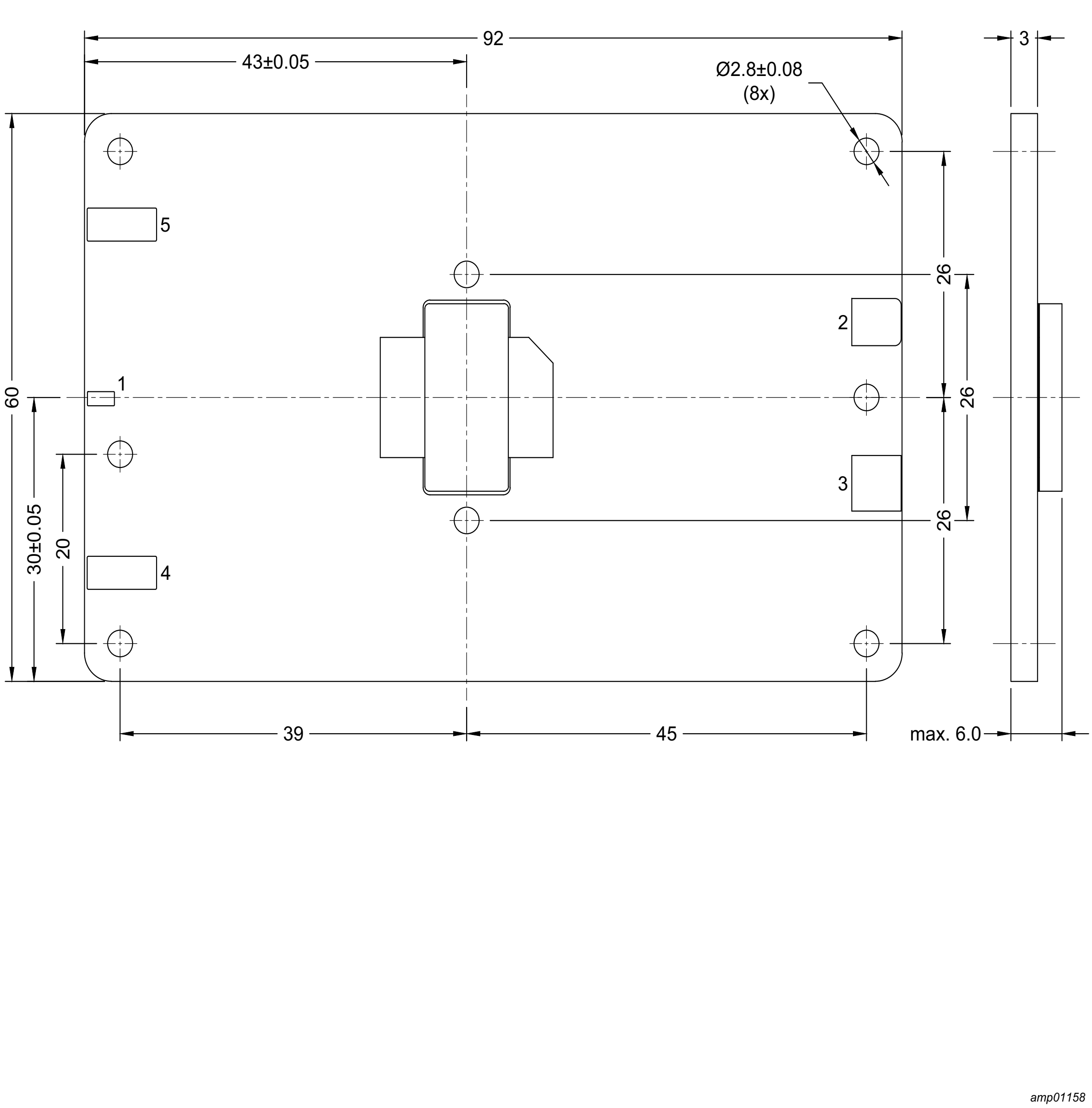
(2) f = 915 MHz

(3) f = 928 MHz

Fig 12. Drain efficiency as a function of output power; typical values

8. Package outline

Pallet; 8 mounting holes; 5 terminations | BPF0910H9X600



Outline version	units in mm	Tolerances unless otherwise stated: Dimensions: ± 0.1 Angle: ± 1°	European projection	Issue date
BPF0910H9X600				2019-11-05

Fig 13. Package outline

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 7. ESD sensitivity

ESD model	Class
Charged Device Model (CDM); According to ANSI/ESDA/JEDEC standard JS-002	C1 [1]
Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001	1C [2]

[1] CDM classification C1 is granted to any part that passes after exposure to an ESD pulse of 250 V.

[2] HBM classification 1C is granted to any part that passes after exposure to an ESD pulse of 1000 V.

10. Abbreviations

Table 8. Abbreviations

Acronym	Description
CW	Continuous Wave
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
MTF	Median Time to Failure
RoHS	Restriction of Hazardous Substances
VSWR	Voltage Standing Wave Ratio

11. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BPF0910H9X600 v.1	20200326	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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