BPS9G2934X-400

LDMOS S-band radar power module

Rev. 1 — 24 November 2017

AMPLEON

Product data sheet

1. Product profile

1.1 General description

400 W GEN9 LDMOS power module intended for S-band radar applications in the frequency range from 2.9 GHz to 3.4 GHz.

Table 1. Test information

Typical RF performance at T_{amb} = 25 °C; t_p = 300 µs; δ = 10 %; I_{Dq} = 400 mA; P_L = 400 W; in a class-AB test circuit.

Test signal	f	V_{DS}	P_L	G_p	η_D
	(MHz)	(V)	(W)	(dB)	(%)
pulsed RF	2900 to 3400	32	400	12	43

1.2 Features and benefits

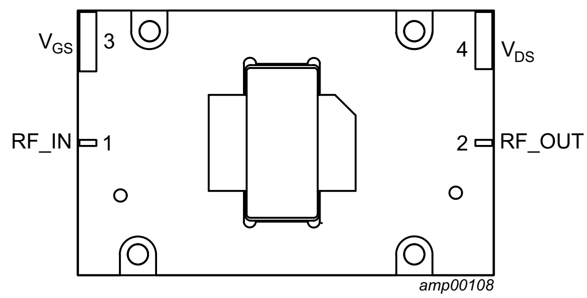
- 400 W pulsed RF power designed for S-band (2.9 GHz to 3.4 GHz)
- Small size: 5.5 × 3.5 cm
- Low weight: 85 g
- Excellent ruggedness, VSWR 10 : 1
- 1 × 10^6 h MTTF
- Input/output 50 Ω matched
- High efficiency
- Excellent thermal stability (silver plated base plate)
- High flexibility with respect to pulse formats
- 100 % RF testing in production
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- S-band radar applications in the frequency range 2.9 GHz to 3.4 GHz

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
V_{GS}	3	gate-source voltage
V_{DS}	4	drain-source voltage

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BPS9G2934X-400	-	pallet LDMOS; 4 mounting holes; 4 terminations	-

4. Block diagram

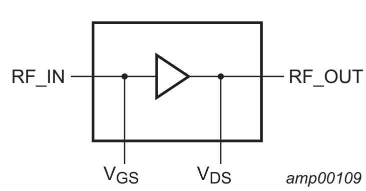


Fig 2. Block diagram

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		-	65	V
V_{GS}	gate-source voltage		–6	+11	V
T_{amb}	ambient temperature		–40	+85	°C
T_{stg}	storage temperature		–20	+70	°C
T_j	junction temperature	[1]	-	225	°C

[1] BLS9G2934L(S)-400 transistor junction temperature.
Continuous use at maximum temperature has influence on the reliability, for details refer to the online MTF calculator.

6. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$Z_{th(j-c)}$	transient thermal impedance from junction to case	T_{case} = 85 °C; P_L = 400 W; t_p = 300 μs; δ = 10 % [1]	0.145	K/W

[1] BLS9G2934L(S)-400 transistor thermal impedance.

7. Characteristics

Table 6. RF characteristics

Test signal: pulsed RF; t_p = 300 μs; δ = 10 %; RF performance at V_{DS} = 32 V; I_{Dq} = 400 mA; T_{amb} = 25 °C; unless otherwise specified.

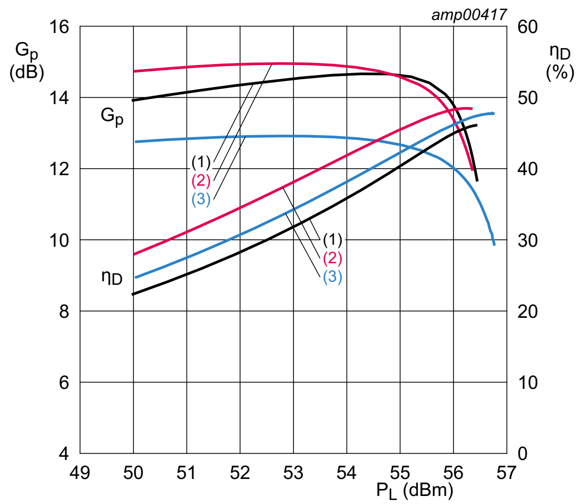
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
f	frequency		2900	-	3400	MHz
V_{DD}	supply voltage		-	32	-	V
V_{GS}	gate-source voltage		-	1.8	2.5	V
ΔG_p	power gain variation	P_L = 400 W	-	3	-	dB
$P_{droop(pulse)}$	pulse droop power	P_L = 400 W	-	0.15	0.5	dB
G_p	power gain	P_L = 400 W	10	12	-	dB
η_D	drain efficiency	P_L = 400 W	40	43	-	%
RL_{in}	input return loss	P_L = 400 W	5.5	8	-	dB
t_r	rise time		-	6	50	ns
t_f	fall time		-	6	50	ns

7.1 Ruggedness in class-AB operation

The BPS9G2934X-400 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 32 V; I_{Dq} = 400 mA; P_L = 400 W; t_p = 300 μs; δ = 10 %.

8. Test information

8.1 Graphical data



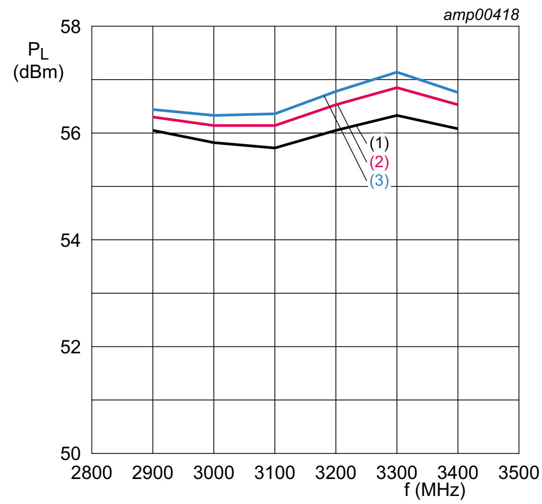
t_p = 300 μs; δ = 10 %; I_{Dq} = 400 mA; V_{DS} = 32 V; T_{amb} = 25 °C.

(1) f = 2900 MHz

(2) f = 3100 MHz

(3) f = 3400 MHz

Fig 3. Power gain and drain efficiency as function of output power; typical values



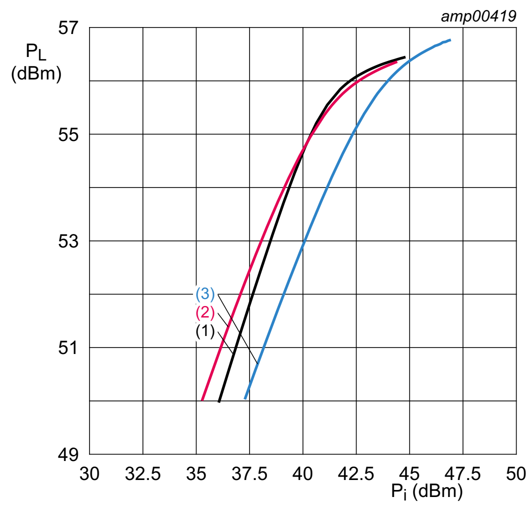
t_p = 300 μs; δ = 10 %; I_{Dq} = 400 mA; V_{DS} = 32 V; T_{amb} = 25 °C.

(1) $P_{L(1dB)}$

(2) $P_{L(2dB)}$

(3) $P_{L(3dB)}$

Fig 4. Output power at gain compression as a function of frequency; typical values



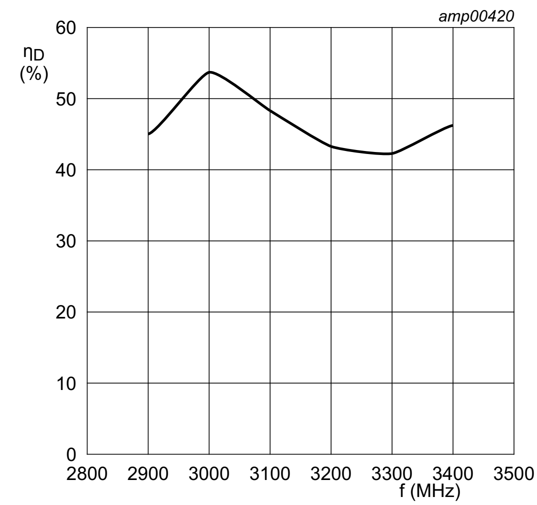
t_p = 300 μs; δ = 10 %; I_{Dq} = 400 mA; V_{DS} = 32 V; T_{amb} = 25 °C.

(1) f = 2900 MHz

(2) f = 3100 MHz

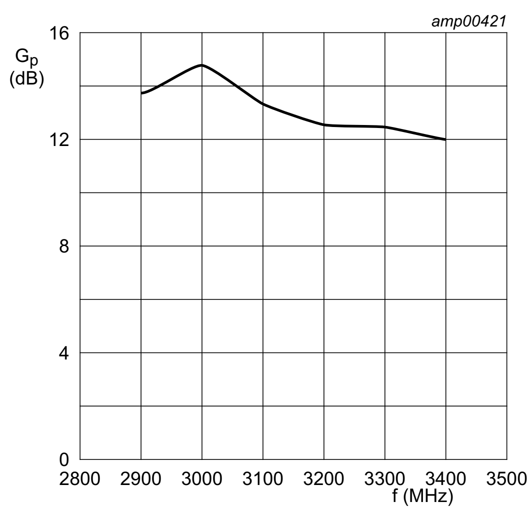
(3) f = 3400 MHz

Fig 5. Output power as a function of input power; typical values



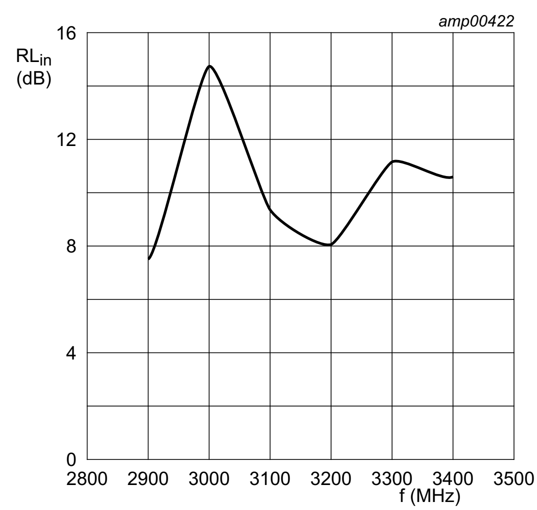
t_p = 300 μs; δ = 10 %; I_{Dq} = 400 mA; V_{DS} = 32 V; T_{amb} = 25 °C; P_L = 400 W.

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



t_p = 300 μs; δ = 10 %; I_{Dq} = 400 mA; V_{DS} = 32 V; T_{amb} = 25 °C; P_L = 400 W.

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

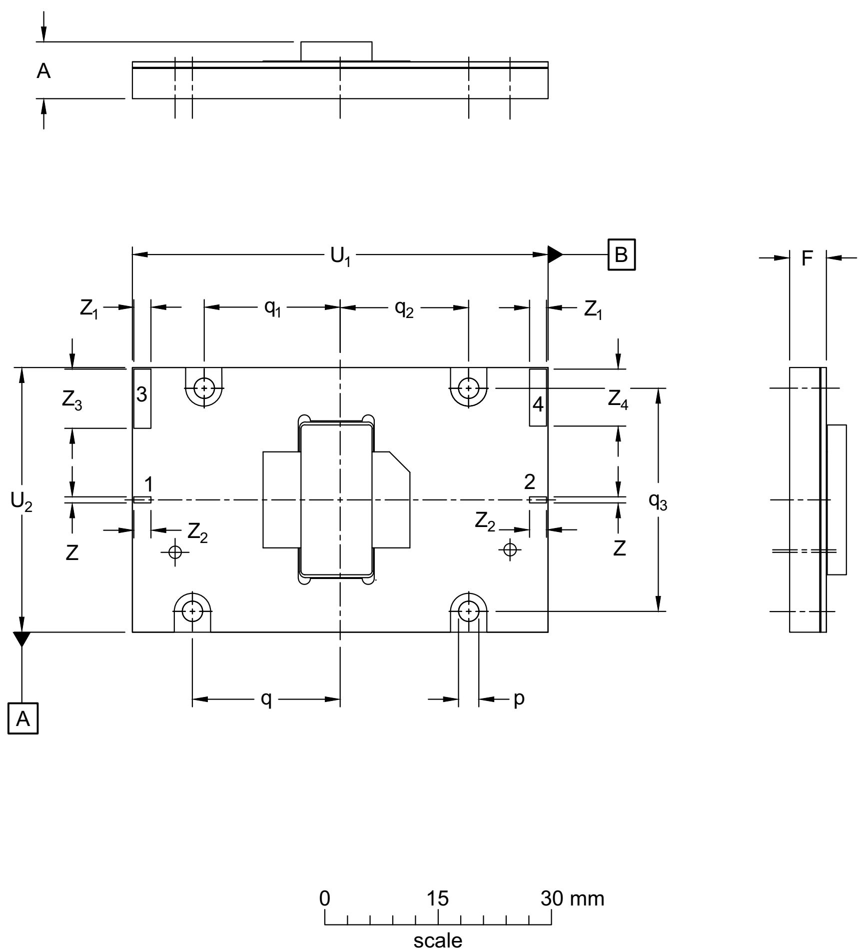


t_p = 300 μs; δ = 10 %; I_{Dq} = 400 mA; V_{DS} = 32 V; T_{amb} = 25 °C; P_L = 400 W.

Fig 8. Input return loss as a function of frequency; typical values

9. Package outline

Pallet; 4 mounting holes; 4 terminations BPS9G2934X-400



Dimensions

Unit		A	F	p	U_1	U_2	q	q_1	q_2	q_3	Z	Z_1	Z_2	Z_3	Z_4
mm	max	7.5	5.10	2.8	55.0	35.0	19.60	18.05	17.05	29.55	0.9	2.30	2.30	7.94	7.65
	nom														
	min	-	4.64	2.7	54.9	34.9	19.50	17.95	16.95	29.45	0.7	2.20	2.20	7.74	7.45

amp00423

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
BPS9G2934X-400						2017-07-27

Fig 9. Package outline

10. 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	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, but fails 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, but fails after exposure to an ESD pulse of 4000 V.

11. Abbreviations

Table 8. Abbreviations

Acronym	Description
GEN9	Ninth Generation
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
S-band	Short wave band
MTF	Median Time to Failure
MTTF	Mean Time To Failure
VSWR	Voltage Standing-Wave Ratio

12. Revision history

Table 9. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BPS9G2934X-400 v.1	20171124	Product data sheet	-	-

13. Legal information

13.1 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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Date of release: 24 November 2017
Document identifier: BPS9G2934X-400