BPC2425M9X2S250-1

Power LDMOS module

Rev. 1 — 18 October 2018

AMPLEON

Product data sheet

1. Product profile

1.1 General description

250 W LDMOS power module for Industrial, Scientific and Medical (ISM) applications at frequencies from 2400 MHz to 2500 MHz. The module is designed for high-power CW applications.

Table 1. Test information

Typical RF performance at V_{DS} = 32 V; T_{mb} = 25 °C; I_{Dq1} = 25 mA; I_{Dq2} = 50 mA.

Test signal	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)
CW	2450	32	290	31	59
CW pulsed [1]	2450	32	300	32	61

[1] Pulse width is 300 μs; duty cycle is 50 %.

1.2 Features and benefits

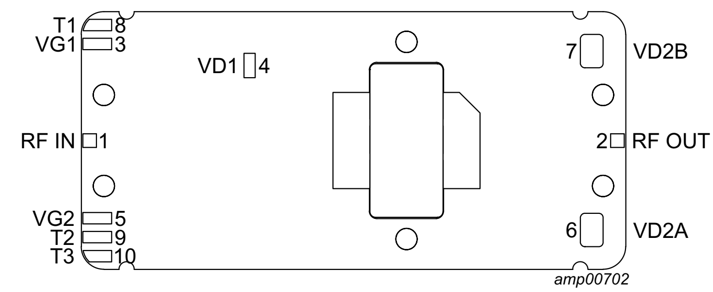
- High efficiency
- Small size: 72 × 34 mm
- Input/output 50 Ω matched
- Designed for broadband operation (2400 MHz to 2500 MHZ)
- Built-in temperature sensors
- 100 % RF testing in production
- For RoHS compliance see the product details on the Ampleon website

1.3 Applications

- RF power amplifiers for CW applications in the 2400 MHz to 2500 MHz frequency range such as industrial heating and drying, scientific, medical, plasma lighting and solid state cooking

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 (50 Ω line)
RF OUT	2	RF output (50 Ω line)
VG1	3	gate voltage V_{GS1} (driver stage)
VD1	4	drain voltage V_{DS1} (driver stage)
VG2	5	gate voltage V_{GS2} (final stage)
VD2A	6	drain voltage V_{DS2} (final stage) [1]
VD2B	7	drain voltage V_{DS2} (final stage) [1]
T1	8	temperature sensor
T2	9	temperature sensor
T3	10	temperature sensor

[1] Drain voltage must be applied for both pins VD2A and VD2B

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BPC2425M9X2S250-1	-	pallet; 6 mounting holes; 10 terminations	-

4. Block diagram

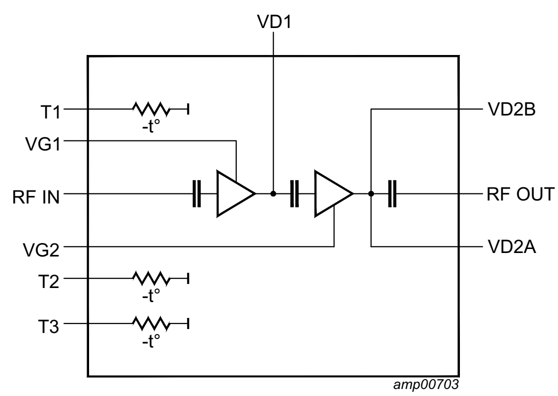


Fig 2. Block diagram

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	65	V
V_{GS}	gate-source voltage	non operating	−0.5	+13	V
T_{stg}	storage temperature		−65	+85	°C
T_{mb}	mounting base temperature	[1]	0	60	°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 = 2.7 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 32 V; I_{Dq1} = 25 mA; I_{Dq2} = 50 mA				
		driver stage	-	1.8	-	V
		final stage	-	1.75	-	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 32 V				
		driver stage	-	-	140	μA
		final stage	-	-	4.20	μA
R_{GS}	gate-source resistance	VG1 pin input	-	10	-	kΩ
		VG2 pin input	-	10	-	kΩ

Table 5. DC characteristics *...continued*

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_{iss}	input capacitance	VG1 pin input	-	0.01	-	μF
		VG2 pin input	-	0.01	-	μF
		VD1 pin input	-	0.47	-	μF
		VD2 pin input	-	1	-	μF

Table 6. RF Characteristics

Test signal: CW; RF performance at T_{mb} = 25 °C; V_{DS} = 32 V; I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; unless otherwise specified; shielded.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	P_L = 250 W; f = 2400 MHz to f = 2500 MHz [1]	28	32.5	-	dB
$P_{L(1dB)}$	output power at 1 dB gain compression	f = 2400 MHz to f = 2500 MHz	240	290	-	W
$P_{L(3dB)}$	output power at 3 dB gain compression	f = 2400 MHz to f = 2500 MHz	260	300	-	W
f	frequency	P_L = 250 W	2400	-	2500	MHz
G_{flat}	gain flatness	P_L = 250 W; f = 2400 MHz to f = 2500 MHz	-	4	-	dB
RL_{in}	input return loss	P_L = 250 W; f = 2400 MHz to f = 2500 MHz	-	-	−3	dB
η_D	drain efficiency	1 dB gain compression; f = 2450 MHz	55	59	-	%
$\alpha_{sup(H)}$	harmonic suppression	P_L = 250 W; f = 2450 MHz	-	30	-	dBc

[1] The gain may be influenced by the type of shielding.

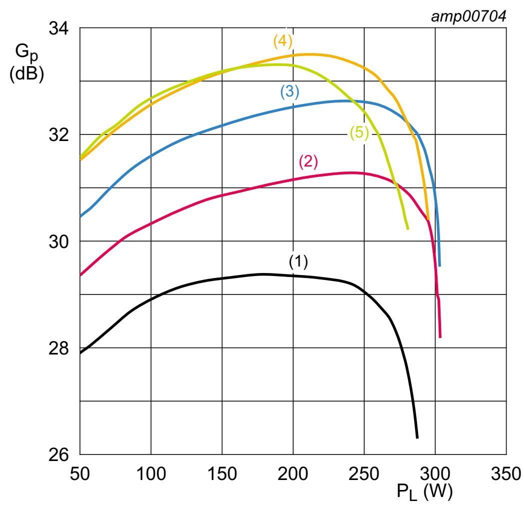
6.1 Ruggedness in class-AB operation

The BPC2425M9X2S250-1 is capable of withstanding a load mismatch corresponding to VSWR = 2 : 1 through all phases with a time rate of 15 ms/degree under the following conditions: V_{DS} = 32 V; I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; P_L = 250 W (CW); f = 2450 MHz; T_{mb} = 25 °C; shielded.

7. Test information

7.1 Graphical data

7.2 CW



I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; V_{DS} = 32 V; T_{mb} = 25 °C.

(1) f = 2400 MHz

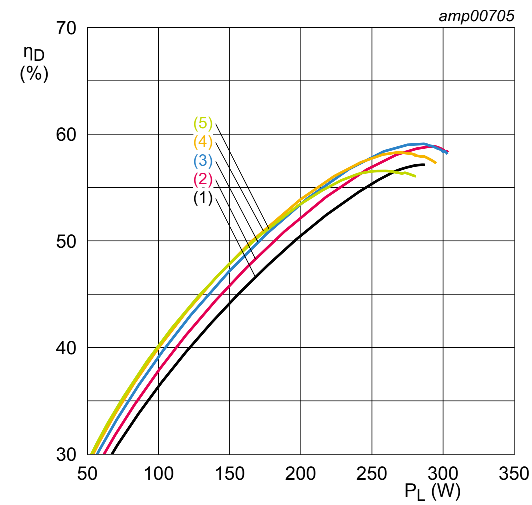
(2) f = 2425 MHz

(3) f = 2450 MHz

(4) f = 2475 MHz

(5) f = 2500 MHz

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



I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; V_{DS} = 32 V; T_{mb} = 25 °C.

(1) f = 2400 MHz

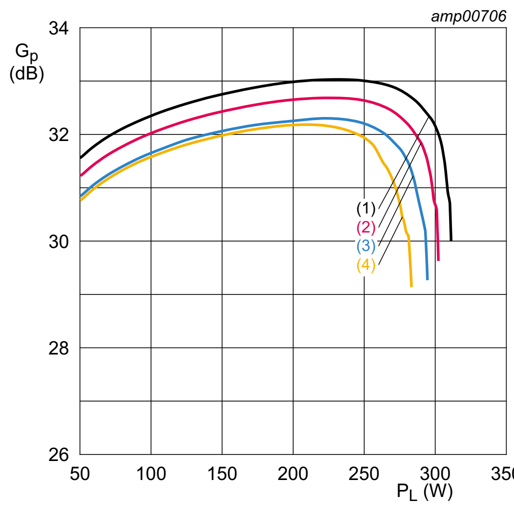
(2) f = 2425 MHz

(3) f = 2450 MHz

(4) f = 2475 MHz

(5) f = 2500 MHz

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



I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; V_{DS} = 32 V; f = 2450 MHz.

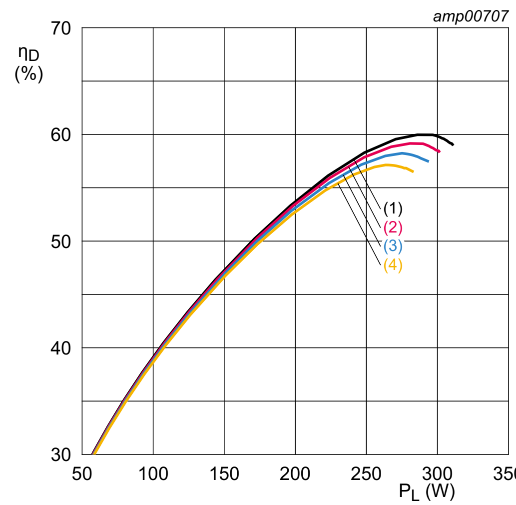
(1) T_{mb} = 5 °C

(2) T_{mb} = 25 °C

(3) T_{mb} = 40 °C

(4) T_{mb} = 60 °C

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



I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; V_{DS} = 32 V; f = 2450 MHz.

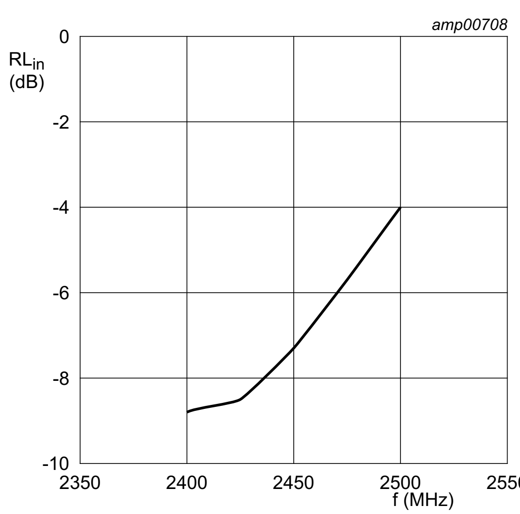
(1) T_{mb} = 5 °C

(2) T_{mb} = 25 °C

(3) T_{mb} = 40 °C

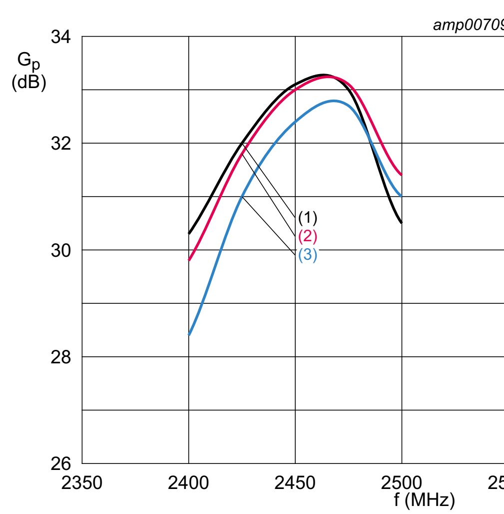
(4) T_{mb} = 60 °C

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



I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; V_{DS} = 32 V; P_L = 250 W; T_{mb} = 25 °C.

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



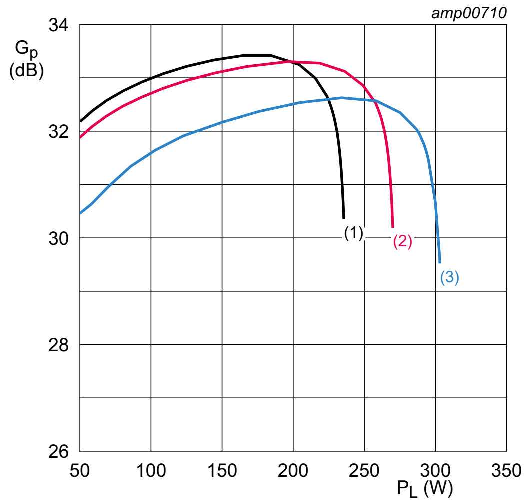
I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; T_{mb} = 25 °C.

(1) V_{DS} = 28 V; P_L = 210 W

(2) V_{DS} = 30 V; P_L = 240 W

(3) V_{DS} = 32 V; P_L = 270 W

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



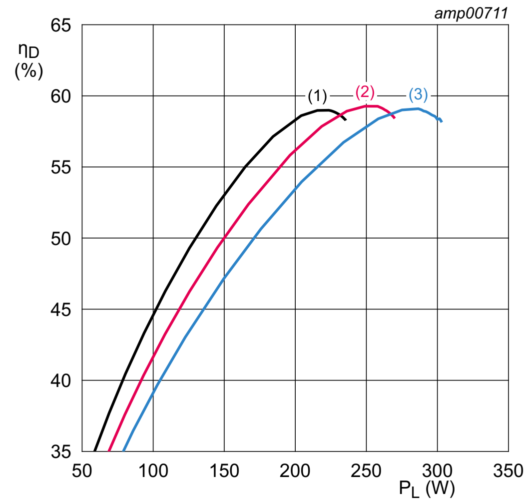
I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; T_{mb} = 25 °C; f = 2450 MHz.

(1) V_{DS} = 28 V

(2) V_{DS} = 30 V

(3) V_{DS} = 32 V

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



I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; T_{mb} = 25 °C; f = 2450 MHz.

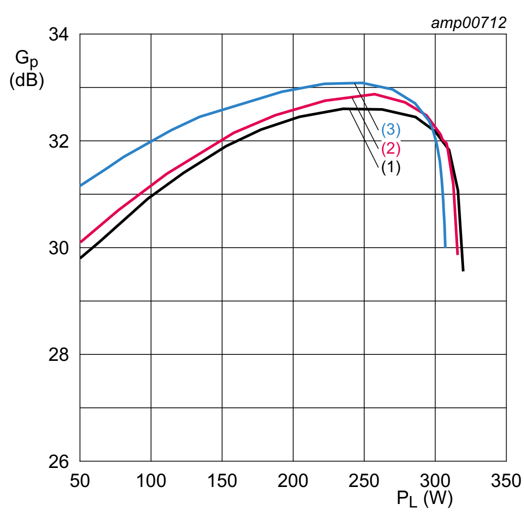
(1) V_{DS} = 28 V

(2) V_{DS} = 30 V

(3) V_{DS} = 32 V

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

7.3 CW pulsed



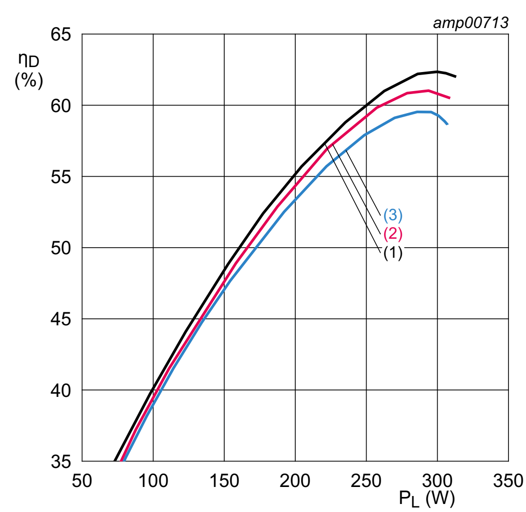
I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; V_{DS} = 32 V; T_{mb} = 25 °C; f = 2450 MHz.

(1) t_p = 300 μs; δ = 10 %

(2) t_p = 300 μs; δ = 50 %

(3) t_p = 300 μs; δ = 90 %

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



I_{Dq1} = 25 mA; I_{Dq2} = 50 mA; V_{DS} = 32 V; T_{mb} = 25 °C; f = 2450 MHz.

(1) t_p = 300 μs; δ = 10 %

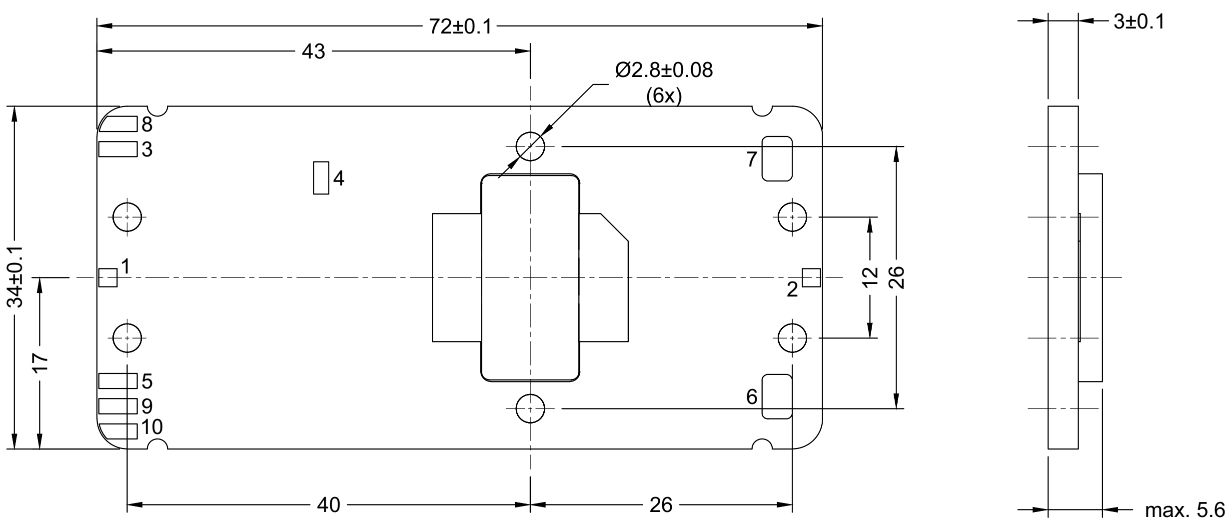
(2) t_p = 300 μs; δ = 50 %

(3) t_p = 300 μs; δ = 90 %

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

8. Package outline

Pallet; 6 mounting holes; 10 terminations | BPC2425M9X2S250-1



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Outline version	units in mm	Tolerances unless otherwise stated: Dimensions: ± 0.15 Angle: ± 1°	European projection	Issue date
BPC2425M9X2S250-1				2018-04-16

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
BPC2425M9X2S250-1 v.1	20181018	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

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