BLM6G22-30; BLM6G22-30G

W-CDMA 2100 MHz to 2200 MHz power MMIC AMPLEON

Rev. 5 — 1 September 2015 **Product data sheet**

1. Product profile

1.1 General description

30 W LDMOS 2-stage power MMIC for base station applications at frequencies from 2100 MHz to 2200 MHz. Available in gull wing for surface mount (SOT822-1) or flat lead (SOT834-1).

Table 1. Typical performance

Typical RF performance at T_h = 25 °C.

Mode of operation	f (MHz)	V_{DS} (V)	$P_{L(AV)}$ (W)	G_p (dB)	η_D (%)	IMD3 (dBc)	ACPR (dBc)
2-carrier W-CDMA	2110 to 2170	28	2	29.5	9	−48[1]	−50[1]

[1] Test signal: 3GPP; test model 1; 64 DPCH; PAR = 7 dB at 0.01 % probability on CCDF per carrier; carrier spacing 10 MHz.

CAUTION

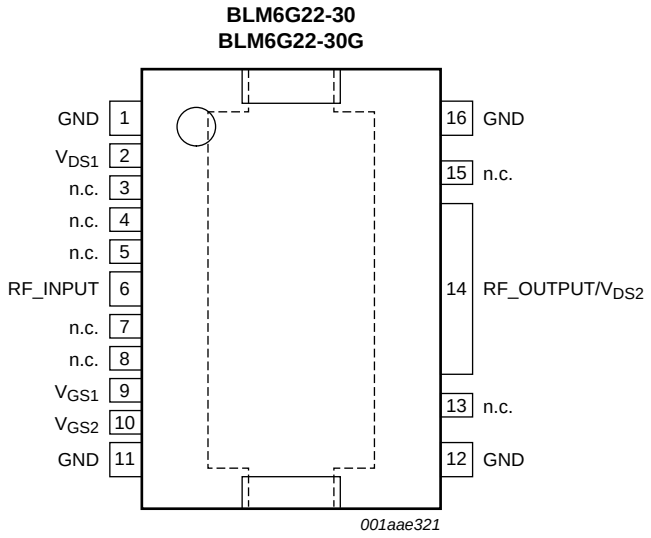
This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features and benefits

- Typical 2-carrier W-CDMA performance at a frequency of 2110 MHz:
  - Average output power = 2 W
  - Power gain = 30 dB (typ)
  - Efficiency = 9 %
  - IMD3 = −48 dBc
  - ACPR = −50 dBc
- Integrated temperature compensated bias
- Excellent thermal stability
- Biasing of individual stages is externally accessible
- Integrated ESD protection
- Small component size, very suitable for PA size reduction
- On-chip matching (input matched to 50 Ohm, output partially matched)
- High power gain
- Designed for broadband operation (2100 MHz to 2200 MHz)
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

2. Pinning information

2.1 Pinning



Transparent top view.

Fig 1. Pin configuration

2.2 Pin description

Table 2. Pin description

Symbol	Pin	Description
GND	1, 11, 12, 16	ground
V_{DS1}	2	first stage drain-source voltage
n.c.	3, 4, 5, 7, 8, 13, 15	not connected
RF_INPUT	6	RF input
V_{GS1}	9	first stage gate-source voltage
V_{GS2}	10	second stage gate-source voltage
RF_OUT/V_{DS2}	14	RF output or second stage drain-source voltage
RF_GND	flange	RF ground

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLM6G22-30	HSOP16F	plastic, heatsink small outline package; 16 leads (flat)	SOT834-1
BLM6G22-30G	HSOP16	plastic, heatsink small outline package; 16 leads	SOT822-1

4. Block diagram

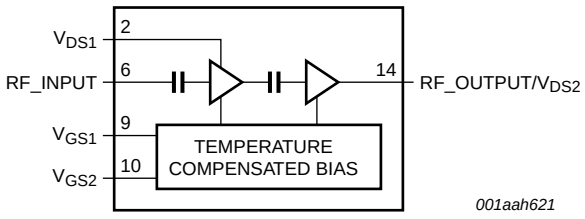


Fig 2. Block diagram of BLM6G22-30 and BLM6G22-30G

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		0.5	+13	V
I_{D1}	first stage drain current		-	3	A
I_{D2}	second stage drain current		-	9	A
T_{stg}	storage temperature		−65	+150	°C
T_j	junction temperature		-	200	°C

6. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions		Value	Unit
$R_{th(j-c)1}$	first stage thermal resistance from junction to case	T_{case} = 25 °C; P_L = 2 W; 2-carrier W-CDMA	[1]	3.9	K/W
$R_{th(j-c)2}$	second stage thermal resistance from junction to case	T_{case} = 25 °C; P_L = 2 W; 2-carrier W-CDMA	[1]	2.1	K/W

[1] Thermal resistance is determined under specific RF operating conditions.

7. Characteristics

Table 6. Characteristics

Mode of operation: 2-carrier W-CDMA; PAR 7 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH; f_1 = 2112.5 MHz; f_2 = 2122.5 MHz; f_3 = 2157.5 MHz; f_4 = 2167.5 MHz; V_{DS} = 28 V; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; T_h = 25 °C unless otherwise specified; in a production test circuit as described in Section 9 "Test information".

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	$P_{L(AV)}$ = 2 W	27.5	30	32.5	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 2 W	-	−14	−10	dB
η_D	drain efficiency	$P_{L(AV)}$ = 2 W	7.5	9	-	%
IMD3	third-order intermodulation distortion	$P_{L(AV)}$ = 2 W	-	−48	−44.5	dBc
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 2 W	-	−50	−47	dBc

8. Application information

8.1 Ruggedness

The BLM6G22-30 and BLM6G22-30G are capable of withstanding a load mismatch corresponding to VSWR = 5 : 1 through all phases under the following conditions: V_{DS} = 28 V; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; P_L = 2 W; 2-carrier W-CDMA.

8.2 Impedance information

Table 7. Typical impedance

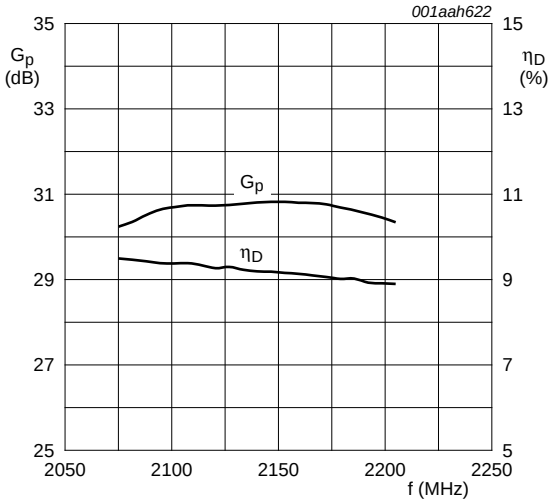
f	Z_i[1]	Z_L[2]
MHz	Ω	Ω
2075	40.9 + j22.8	18.0 – j5.5
2085	41.2 + j23.2	17.8 – j5.6
2095	41.6 + j23.3	17.7 – j5.7
2105	41.9 + j23.3	17.7 – j5.9
2115	42.1 + j23.3	17.6 – j6.0
2125	42.2 + j23.2	17.4 – j6.0
2135	42.4 + j23.1	17.3 – j6.1
2145	42.3 + j22.9	17.2 – j6.1
2155	42.5 + j22.8	17.0 – j6.2
2165	42.6 + j22.8	16.8 – j6.3
2175	42.7 + j22.8	16.6 – j6.4
2185	43.0 + j23.0	16.4 – j6.6
2195	43.6 + j23.1	16.3 – j6.9
2205	44.2 + j23.3	16.1 – j7.2

[1] Device input impedance as measured from gate to ground.

[2] Test circuit impedance as measured from drain to ground.

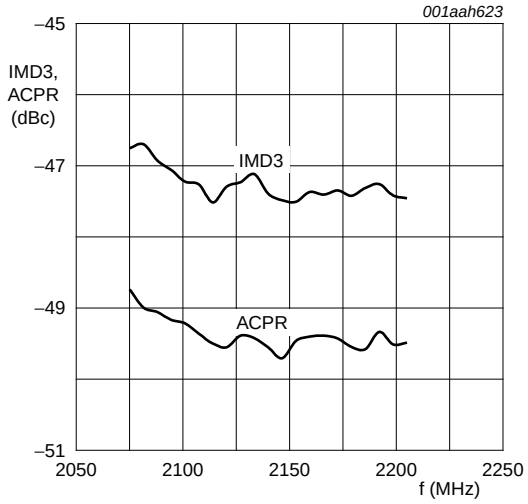
8.3 Performance curves

Performance curves are measured in a BLM6G22-30G application circuit.



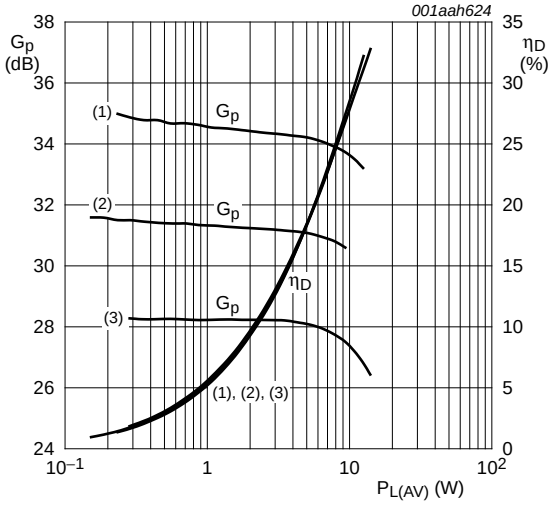
T_{case} = 25 °C; V_{DS} = 28 V; $P_{L(AV)}$ = 2 W; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; carrier spacing = 10 MHz.

Fig 3. 2-carrier W-CDMA power gain and drain efficiency as functions of frequency; typical values



T_{case} = 25 °C; V_{DS} = 28 V; $P_{L(AV)}$ = 2 W; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; carrier spacing = 10 MHz.

Fig 4. 2-carrier W-CDMA adjacent power channel ratio and third order intermodulation distortion as functions of frequency; typical values



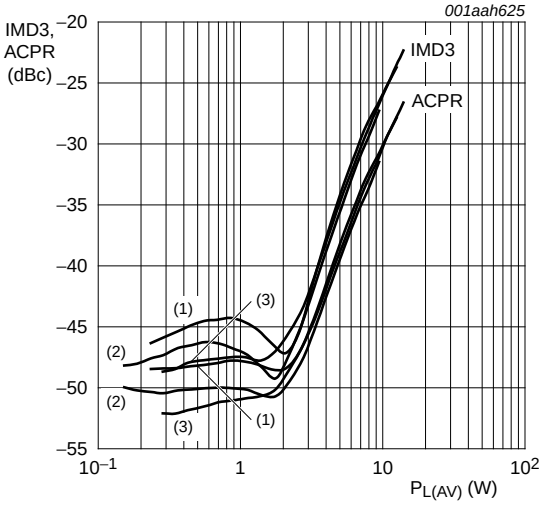
V_{DS} = 28 V; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; carrier spacing = 10 MHz.

(1) T_{case} = −30 °C

(2) T_{case} = 25 °C

(3) T_{case} = 85 °C

Fig 5. 2-carrier W-CDMA power gain and drain efficiency as functions of average output power and temperature; typical values



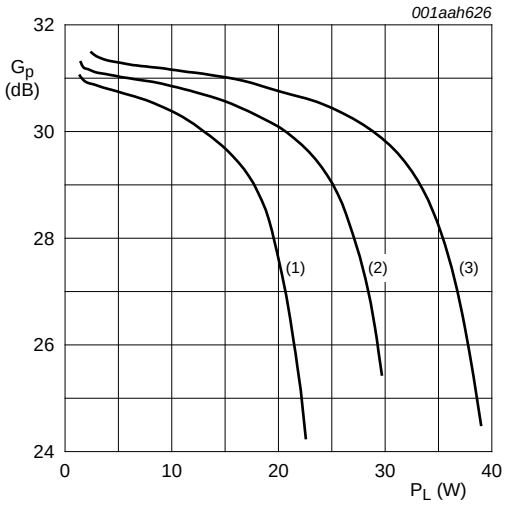
V_{DS} = 28 V; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; carrier spacing = 10 MHz.

(1) T_{case} = −30 °C

(2) T_{case} = 25 °C

(3) T_{case} = 85 °C

Fig 6. 2-carrier W-CDMA adjacent power channel ratio and third order intermodulation distortion as functions of average output power and temperature; typical values



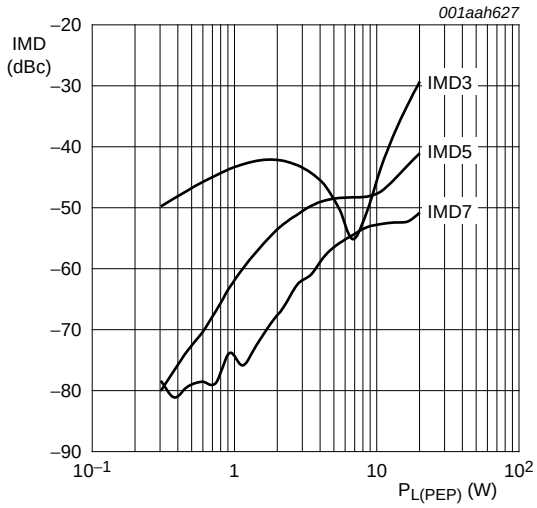
f = 2140 MHz; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA.

(1) V_{DS} = 24 V

(2) V_{DS} = 28 V

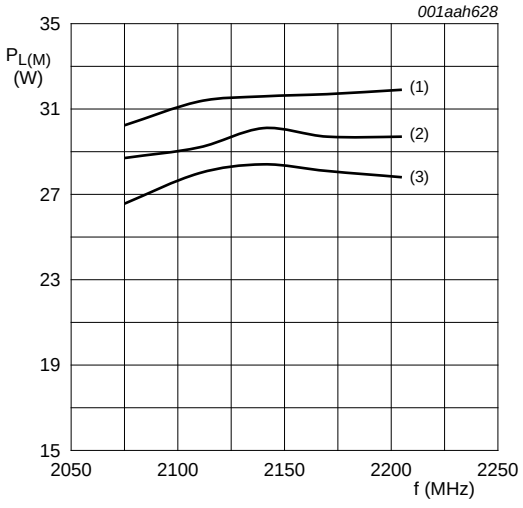
(3) V_{DS} = 32 V

Fig 7. One-tone CW power gain as function of output power and drain-source voltage; typical value



I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; f_1 = 2140 MHz; f_2 = 2140.1 MHz.

Fig 8. Two-tone CW intermodulation distortion as function of peak envelope load power; typical value



Test signal: IS-95 with pilot, paging, sync and 6 traffic channels (Walsh codes 8 to 13). PAR = 9.7 dB at 0.01 % probability on the CCDF.

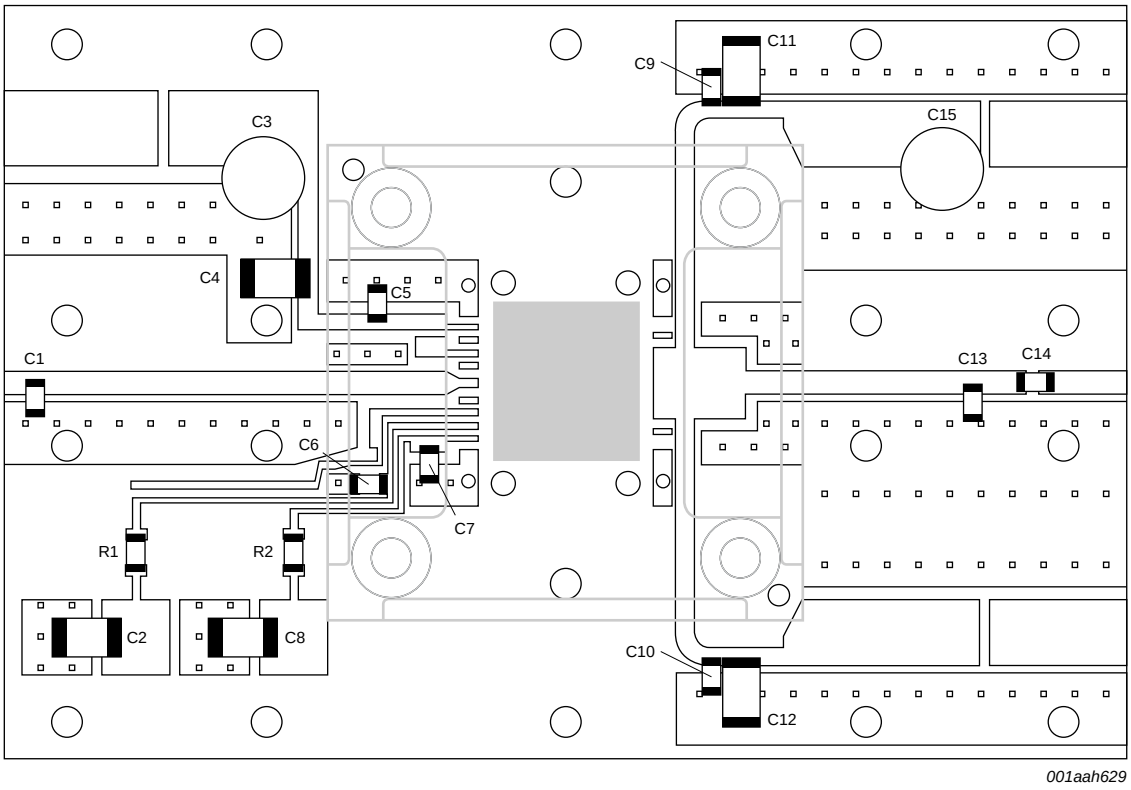
(1) T_{case} = −30 °C

(2) T_{case} = 25 °C

(3) T_{case} = 85 °C

Fig 9. Single-carrier peak output power as function of frequency and temperature; typical values

9. Test information



Striplines are on a double copper-clad Rogers 4350B Printed-Circuit Board (PCB) with ε_r = 3.5; thickness = 0.76 mm. See Table 8 for a list of components.

Fig 10. Component layout for 2110 MHz to 2170 MHz circuit for 2-carrier W-CDMA

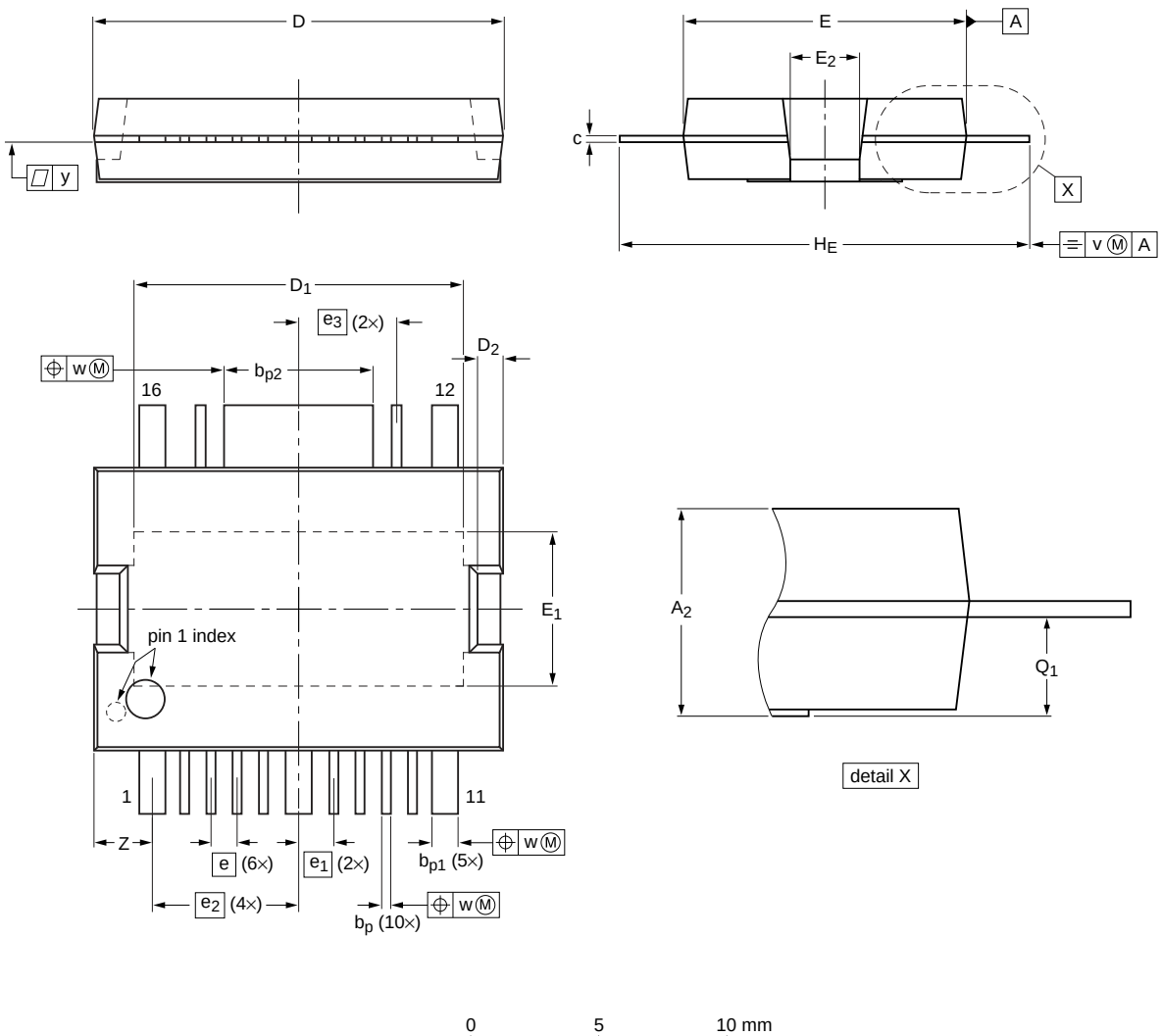
Table 8. List of components
For test circuit see Figure 10.

Component	Description	Value	Remarks
C1, C13	multilayer ceramic chip capacitor	0.3 pF	[1]
C2, C4, C8, C11, C12	multilayer ceramic chip capacitor	4.7 μF; 50 V	
C3, C15	electrolytic capacitor	220 μF; 35 V	
C5, C9, C10, C14	multilayer ceramic chip capacitor	10 pF	[1]
C6, C7	multilayer ceramic chip capacitor	100 nF	
R1	SMD resistor 0805	1 kΩ	
R2	SMD resistor 0805	3.9 kΩ	

[1] American Technical Ceramics (ATC) type 100A or capacitor of same quality.

10. Package outline

HSOP16F: plastic, heatsink small outline package; 16 leads (flat) **SOT834-1**



Dimensions

Unit(1)		A_2	b_p	b_{p1}	b_{p2}	c	D(1)	D_1	D_2	E(1)	E_1	E_2	e	e_1	e_2	e_3	H_E	Q_1	v	w	y	Z
mm	max	3.5	0.43	1.09	5.87	0.32	16.0	13.0	1.1	11.1	6.2	2.9					16.2	1.7				2.5
	nom												1.02	1.37	5.69	3.81			0.25	0.25	0.1	
	min	3.2	0.28	0.94	5.72	0.23	15.8	12.6	0.9	10.9	5.8	2.5					15.8	1.5				2.0

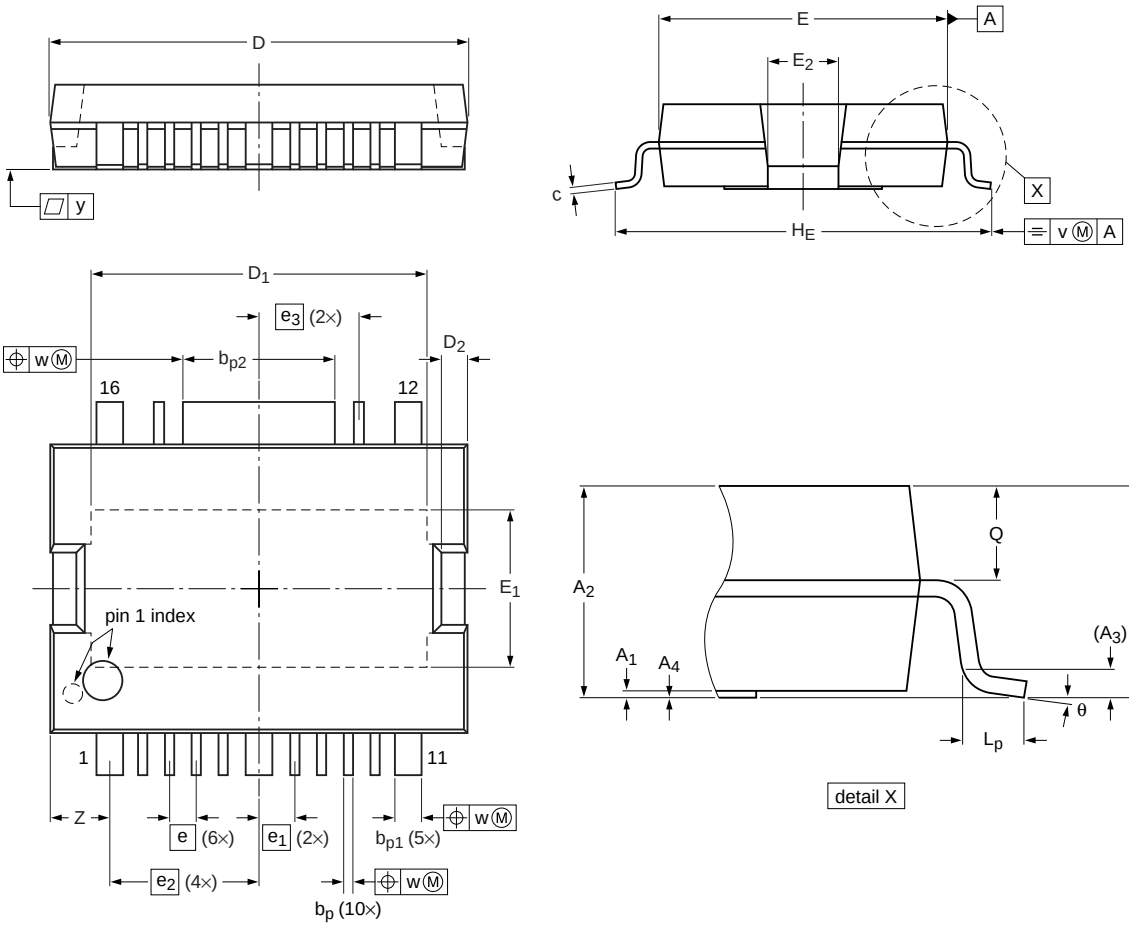
Note
1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

sot834-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT834-1						~~03-10-22~~ 10-10-20

Fig 11. Package outline SOT834-1 (HSOP16F)

HSOP16: plastic, heatsink small outline package; 16 leads **SOT822-1**



Q	v	w	y	Z	θ
1.5	0.25	0.25	0.1	2.5	8°
1.4				2.0	0°

Dimensions

Unit[1]		A	A_1	A_2	A_3	A_4	b_p	b_{p1}	b_{p2}	c	D[1]	D_1	D_2	E[1]	E_1	E_2	e	e_1	e_2	e_3	H_E	L_p
mm	max		0.2	3.5		0.06	0.43	1.09	5.87	0.32	16.0	13.0	1.1	11.1	6.2	2.9					14.5	1.1
	nom	3.6			0.35												1.02	1.37	5.69	3.81		
	min		0	3.2		–0.06	0.28	0.94	5.72	0.23	15.8	12.6	0.9	10.9	5.8	2.5					13.9	0.8

Note
1. Plastic or metal protrusions of 0.25 mm maximum per side are not included

sot822-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT822-1						~~07-02-08~~ 10-10-20

Fig 12. Package outline SOT822-1 (HSOP16)

11. Handling information

11.1 ESD protection

Table 9. ESD protection characteristics

Test condition	Class
Human Body Model (HBM)	1
Machine Model (MM)	1

11.2 Moisture sensitivity

Table 10. Moisture sensitivity level

Test methodology	Class
JESD-22-A113	3

12. Abbreviations

Table 11. Abbreviations

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
IS-95	Interim Standard 95
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
MMIC	Monolithic Microwave Integrated Circuit
PA	Power Amplifier
PAR	Peak-to-Average power Ratio
PDPCH	transmission Power of the Dedicated Physical CHannel
RF	Radio Frequency
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

13. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLM6G22-30_BLM6G22-30G#5	20150901	Product data sheet		BLM6G22-30_BLM6G22-30G v.4
Modifications:	• The format of this document has been redesigned to comply with the new identity guidelines of Ampleon. • Legal texts have been adapted to the new company name where appropriate.			
BLM6G22-30_BLM6G22-30G v.4	20110307	Product data sheet	-	BLM6G22-30_BLM6G22-30G v.3
BLM6G22-30_BLM6G22-30G v.3	20081121	Preliminary data sheet	-	BLM6G22-30_BLM6G22-30G v.2
BLM6G22-30_BLM6G22-30G v.2	20080904	Preliminary data sheet	-	BLM6G22-30_BLM6G22-30G v.1
BLM6G22-30_BLM6G22-30G v.1	20080303	Objective data sheet	-	-

14. Legal information

14.1 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.

14.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. Ampleon does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local Ampleon sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between Ampleon and its customer, unless Ampleon and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the Ampleon product is deemed to offer functions and qualities beyond those described in the Product data sheet.

14.3 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, Ampleon does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. Ampleon takes no responsibility for the content in this document if provided by an information source outside of Ampleon.

In no event shall Ampleon be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, Ampleon' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of Ampleon.

Right to make changes — Ampleon reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — Ampleon products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an Ampleon product can reasonably be expected to result in personal injury, death or severe property or environmental damage. Ampleon and its suppliers accept no liability for inclusion and/or use of Ampleon products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. Ampleon makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using Ampleon products, and Ampleon accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the Ampleon product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

Ampleon does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using Ampleon products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). Ampleon does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale — Ampleon products are sold subject to the general terms and conditions of commercial sale, as published at http://www.ampleon.com/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. Ampleon hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of Ampleon products by customer.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Non-automotive qualified products — Unless this data sheet expressly states that this specific Ampleon product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. Ampleon accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without Ampleon' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond Ampleon' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies Ampleon for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond Ampleon' standard warranty and Ampleon' product specifications.

14.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

Any reference or use of any 'NXP' trademark in this document or in or on the surface of Ampleon products does not result in any claim, liability or entitlement vis-à-vis the owner of this trademark. Ampleon is no longer part of the NXP group of companies and any reference to or use of the 'NXP' trademarks will be replaced by reference to or use of Ampleon's own Any reference or use of any 'NXP' trademark in this document or in or on the surface of Ampleon products does not result in any claim, liability or entitlement vis-à-vis the owner of this trademark. Ampleon is no longer part of the NXP group of companies and any reference to or use of the 'NXP' trademarks will be replaced by reference to or use of Ampleon's own trademarks.

15. Contact information

For more information, please visit:
http://www.ampleon.com

For sales office addresses, please visit:
http://www.ampleon.com/sales

16. Contents

For more information, please visit: http://www.ampleon.com
For sales office addresses, please visit: http://www.ampleon.com/sales

Date of release: 1 September 2015
Document identifier: BLM6G22-30_BLM6G22-30G#5