BLM6G22-30; BLM6G22-30G

W-CDMA 2100 MHz to 2200 MHz power MMIC

Rev. 03 — 21 November 2008 Preliminary 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	V_{DS}	$P_{L(AV)}$	G_p	η_D	IMD3	ACPR
	(MHz)	(V)	(W)	(dB)	(%)	(dBc)	(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

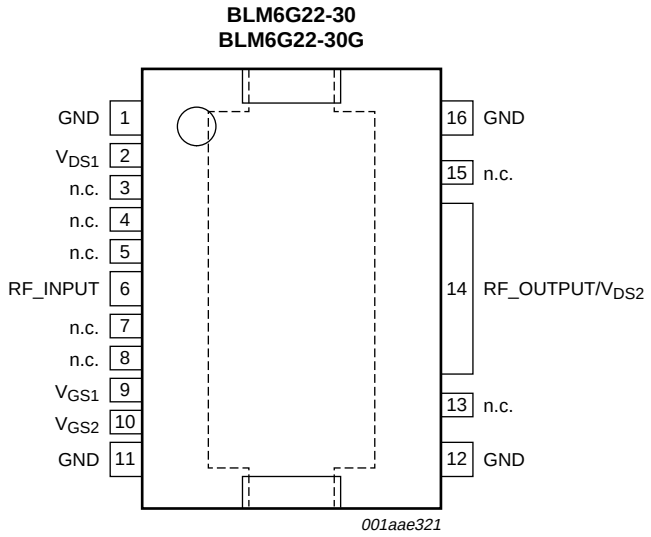
This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features

- 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

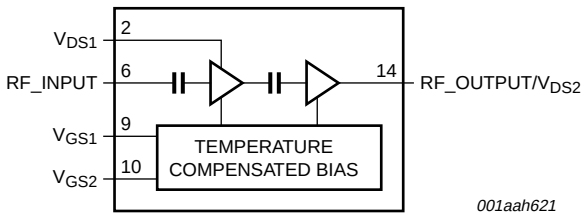


Fig 2. Block diagram of BLM6G22-30 and BLM6G22-30G

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	10	14	-	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

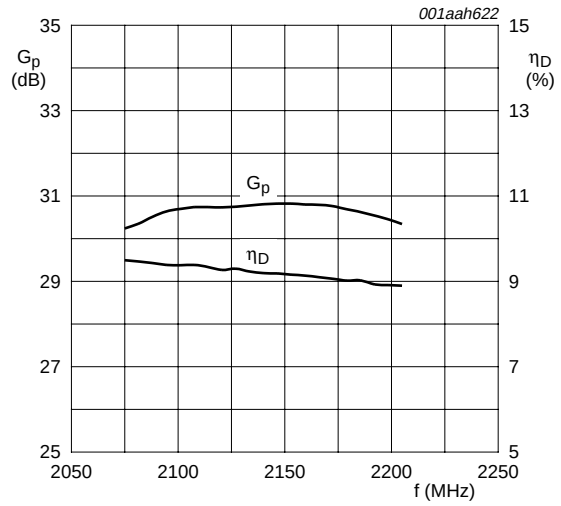
f	Z_i[1]	Z_L[2]
MHz	Ω	Ω
2075	40.9 + j22.8	18.0 – j5.5
2085	41.2 + j23.2	17.8 – j5.6
2095	41.6 + j23.3	17.7 – j5.7
2105	41.9 + j23.3	17.7 – j5.9
2115	42.1 + j23.3	17.6 – j6.0
2125	42.2 + j23.2	17.4 – j6.0
2135	42.4 + j23.1	17.3 – j6.1
2145	42.3 + j22.9	17.2 – j6.1
2155	42.5 + j22.8	17.0 – j6.2
2165	42.6 + 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.

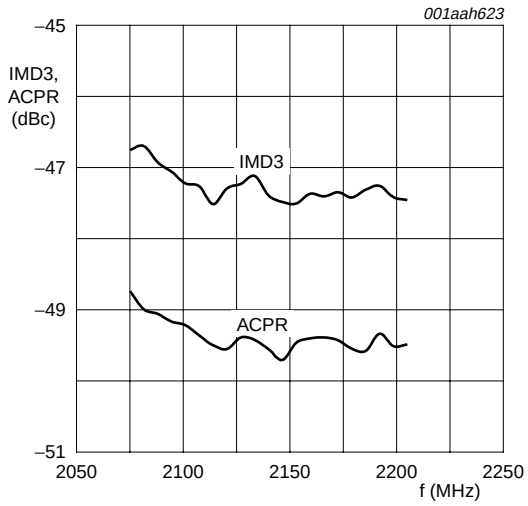
8.3 Performance curves

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



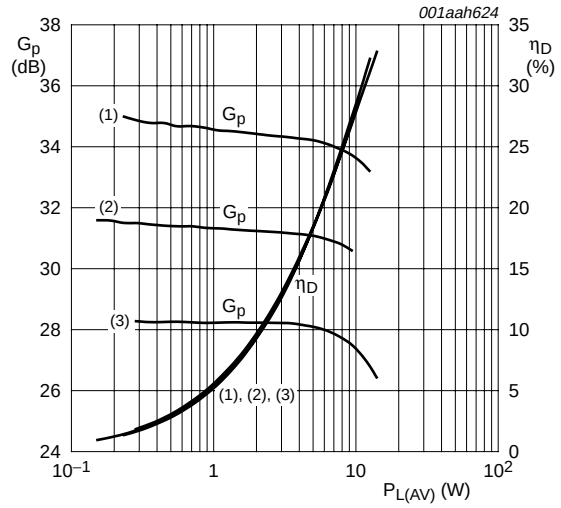
T_{case} = 25 °C; V_{DS} = 28 V; $P_{L(AV)}$ = 2 W; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; carrier spacing = 10 MHz.

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



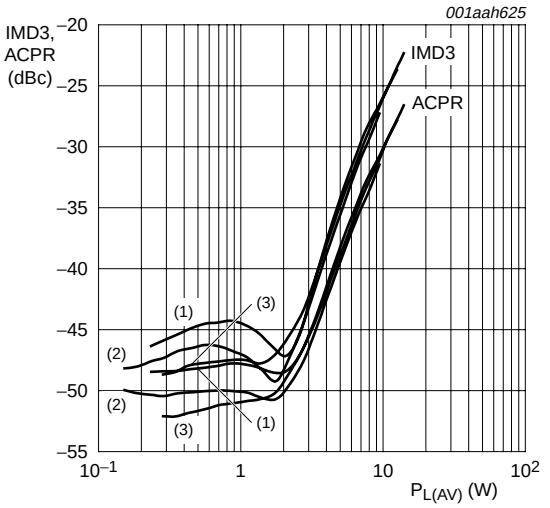
V_{DS} = 28 V; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; carrier spacing = 10 MHz.

(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



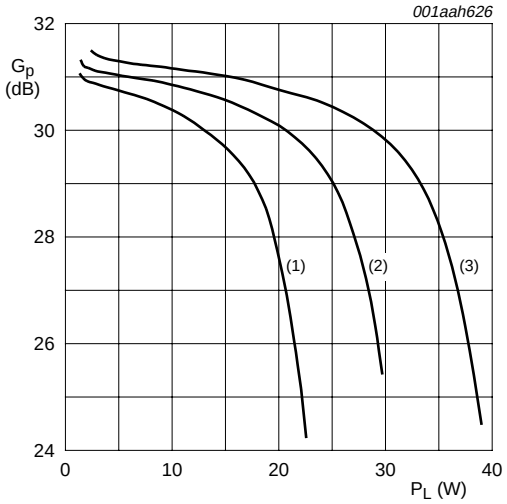
V_{DS} = 28 V; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; carrier spacing = 10 MHz.

(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



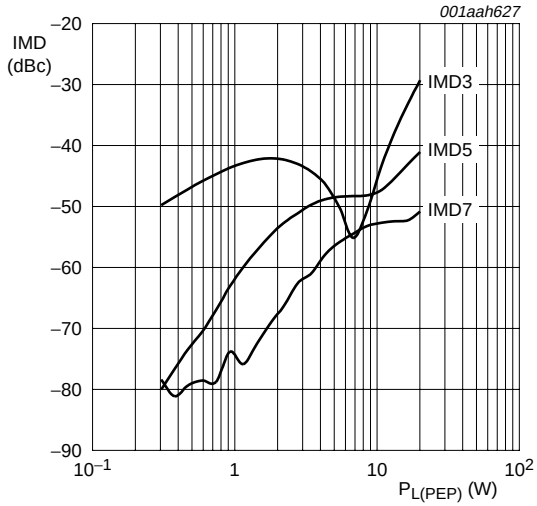
f = 2140 MHz; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA.

(1) V_{DS} = 24 V

(2) V_{DS} = 28 V

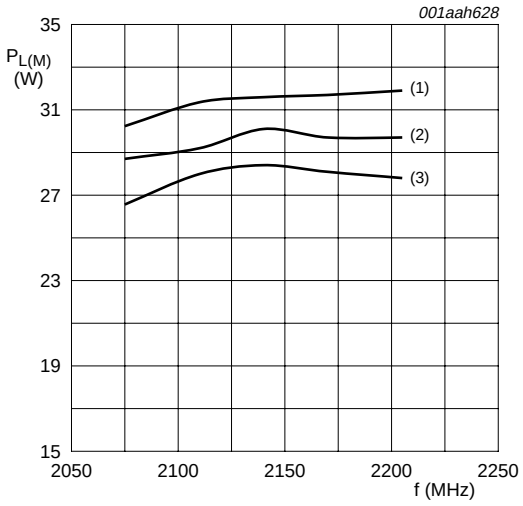
(3) V_{DS} = 32 V

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.

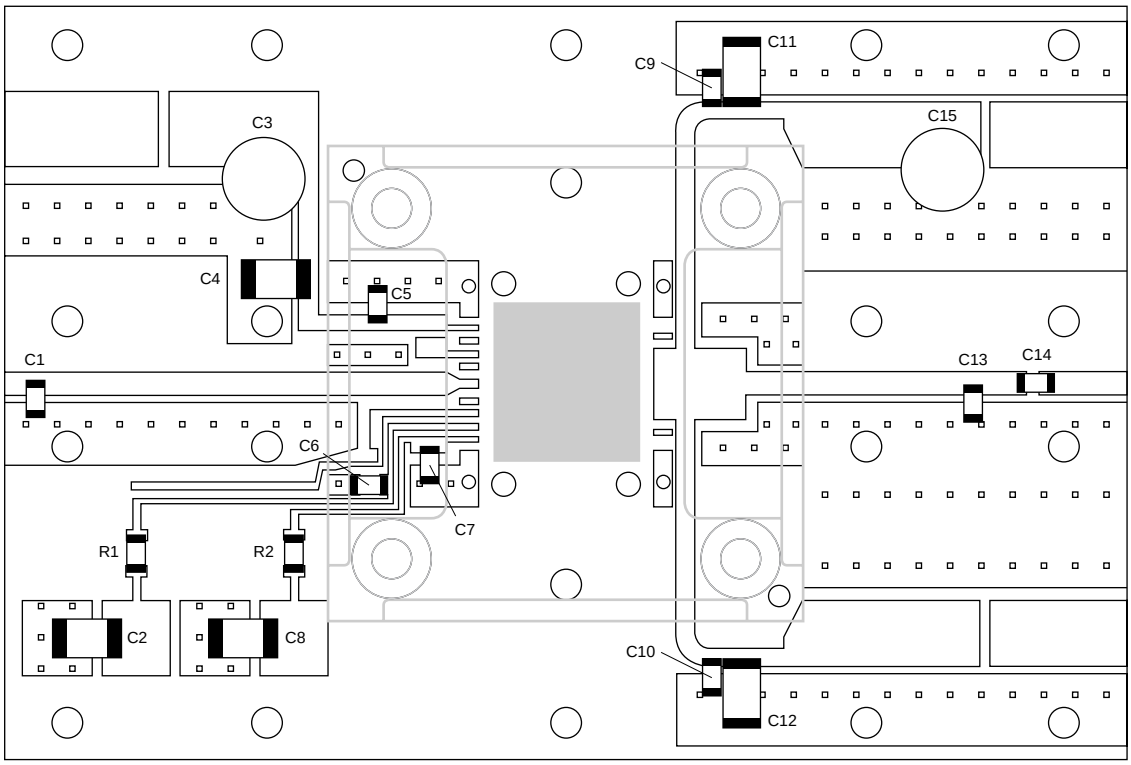
(1) T_{case} = −30 °C

(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

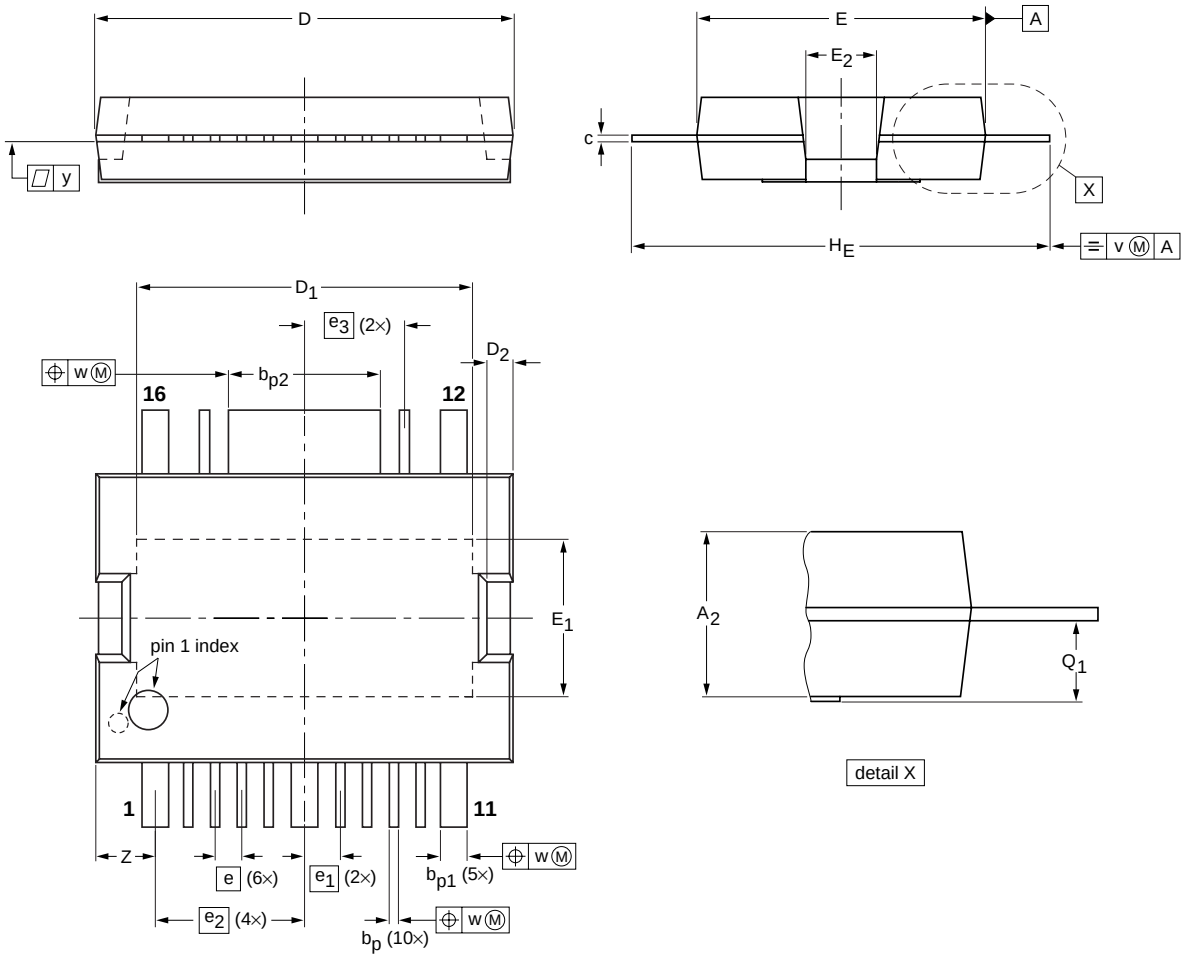
For test circuit see Figure 10.

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 (mm are the original dimensions)

UNIT	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	3.3 3.0	0.43 0.28	1.09 0.94	5.87 5.72	0.32 0.23	16.0 15.8	13.0 12.6	1.1 0.9	11.1 10.9	6.2 5.8	2.9 2.5	1.02	1.37	5.69	3.81	16.2 15.8	1.7 1.5	0.25	0.25	0.1	2.5 2.0

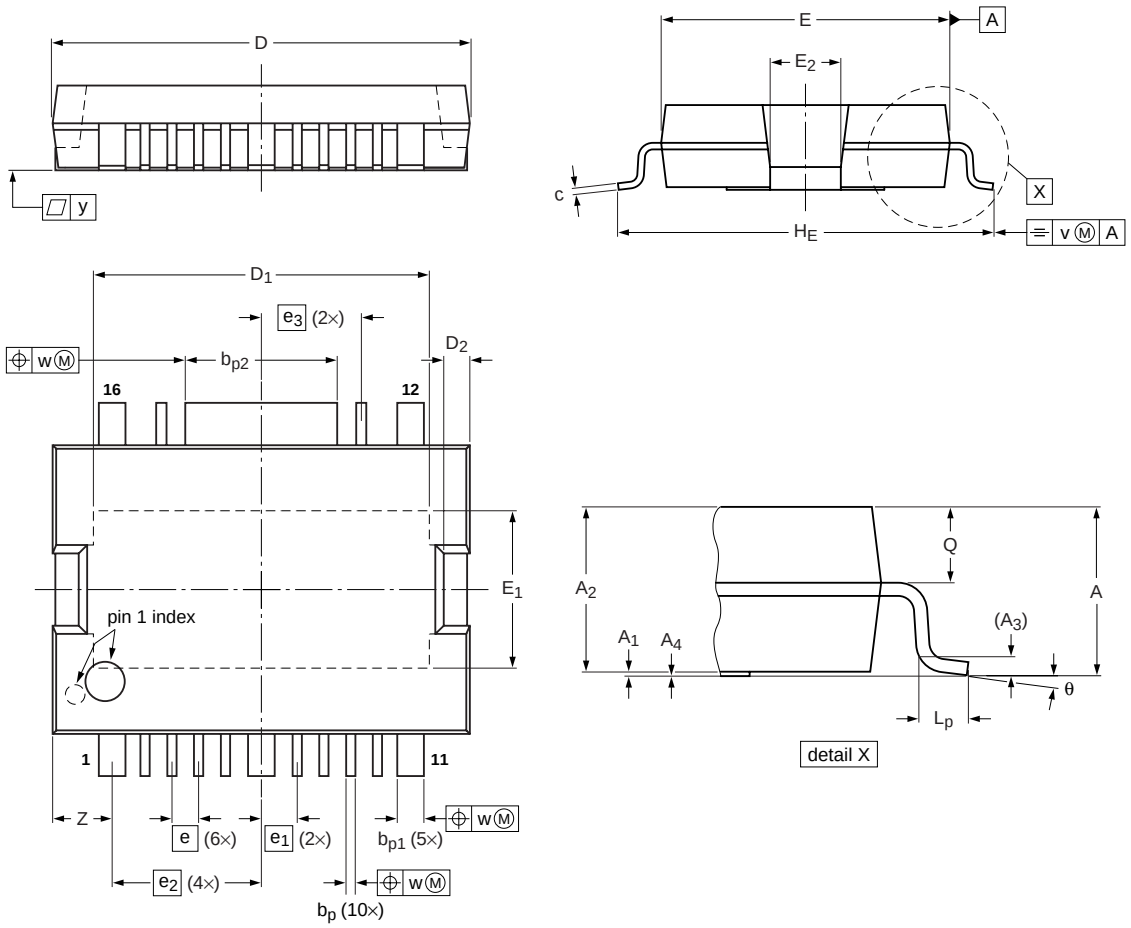
Note

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT834-1						03-10-22

Fig 11. Package outline SOT834-1 (HSOP16F)

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



H_E	L_p	Q	v	w	y	Z	θ
14.5 13.9	1.1 0.8	1.5 1.4	0.25	0.25	0.1	2.5 2.0	8° 0°

DIMENSIONS (mm are the original dimensions)

UNIT	A max	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
mm	3.6	0.2 0	3.3 3.0	0.35	0.06 –0.06	0.43 0.28	1.09 0.94	5.87 5.72	0.32 0.23	16.0 15.8	13.0 12.6	1.1 0.9	11.1 10.9	6.2 5.8	2.9 2.5	1.02	1.37	5.69	3.81

Note

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

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT822-1						~~03-07-23~~ 07-02-08

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_3	20081121	Preliminary data sheet	-	BLM6G22-30_BLM6G22-30G_2
Modifications:	• Figure 5: updated			
BLM6G22-30_BLM6G22-30G_2	20080904	Preliminary data sheet	-	BLM6G22-30_BLM6G22-30G_1
BLM6G22-30_BLM6G22-30G_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".

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