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 (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.

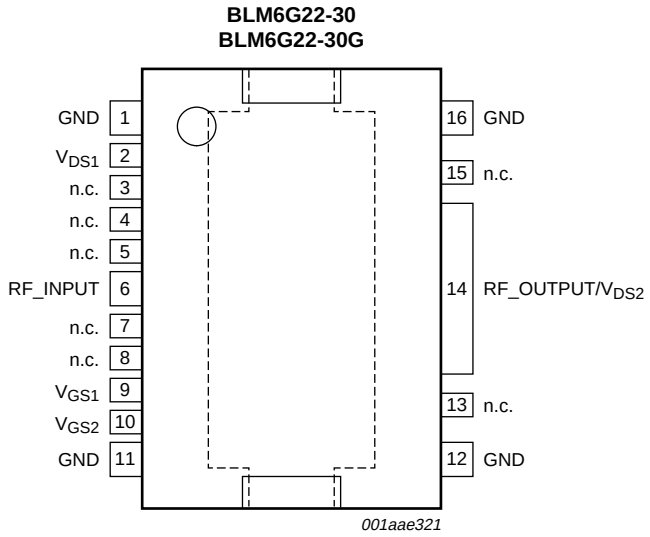
1.2 Features

- 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)

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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

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4. Block diagram

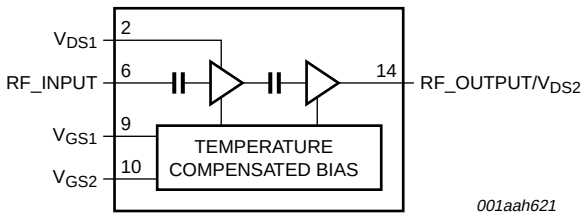


Fig 2. Block diagram of BLM6G22-30 and BLM6G22-30G

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.

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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

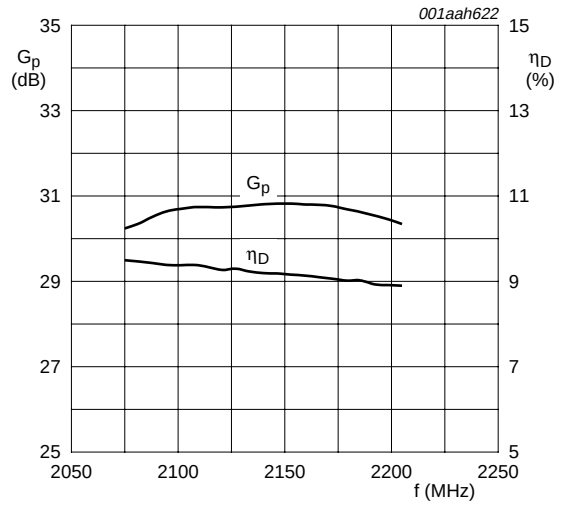
[1] Device input impedance as measured from gate to ground.

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

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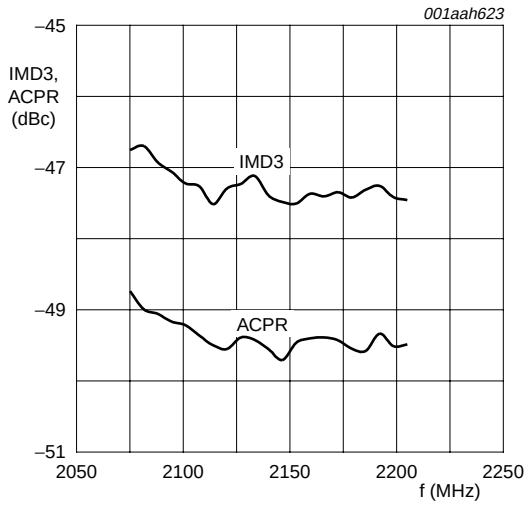
8.3 Performance curves

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



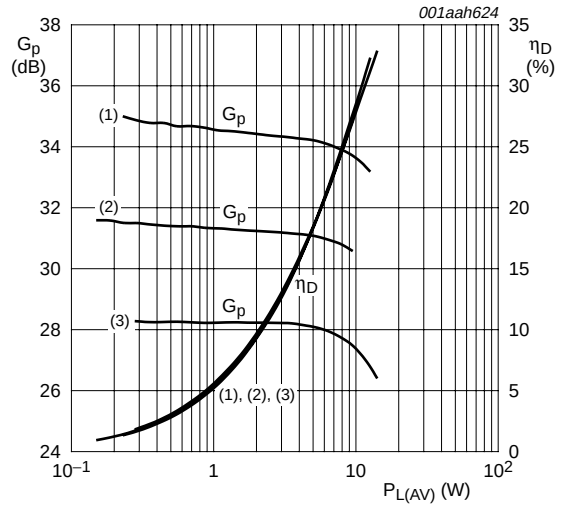
T_{case} = 25 °C; V_{DS} = 28 V; $P_{L(AV)}$ = 2 W; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; carrier spacing = 10 MHz.

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



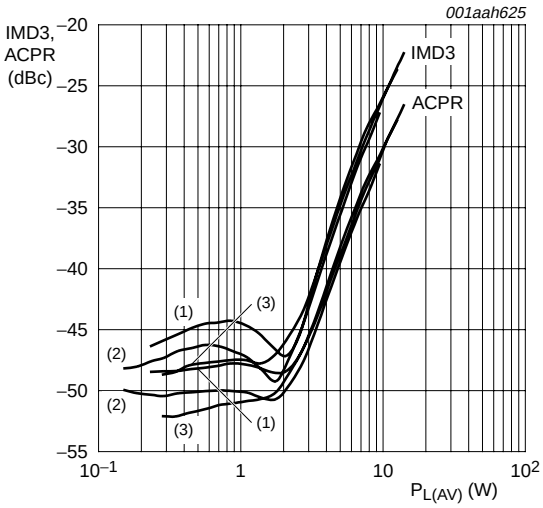
V_{DS} = 28 V; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA; carrier spacing = 10 MHz.

(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.

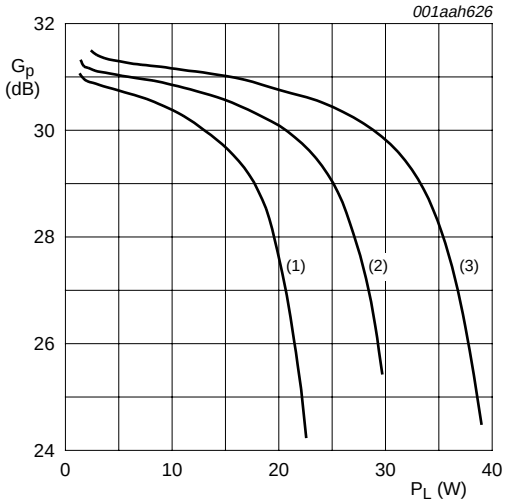
(1) T_{case} = –30 °C

(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

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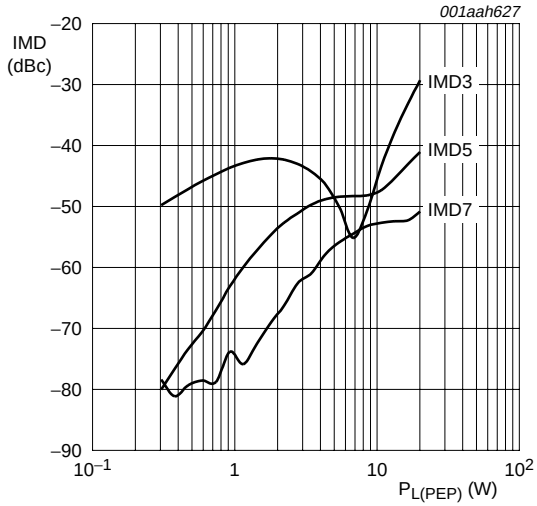
f = 2140 MHz; I_{Dq1} = 270 mA; I_{Dq2} = 280 mA.

(1) V_{DS} = 24 V

(2) V_{DS} = 28 V

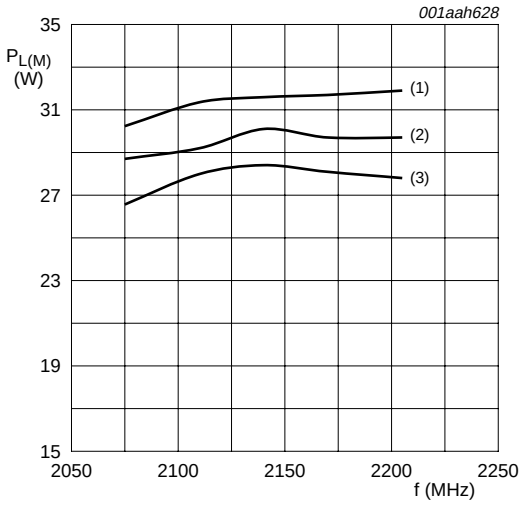
(3) V_{DS} = 32 V

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

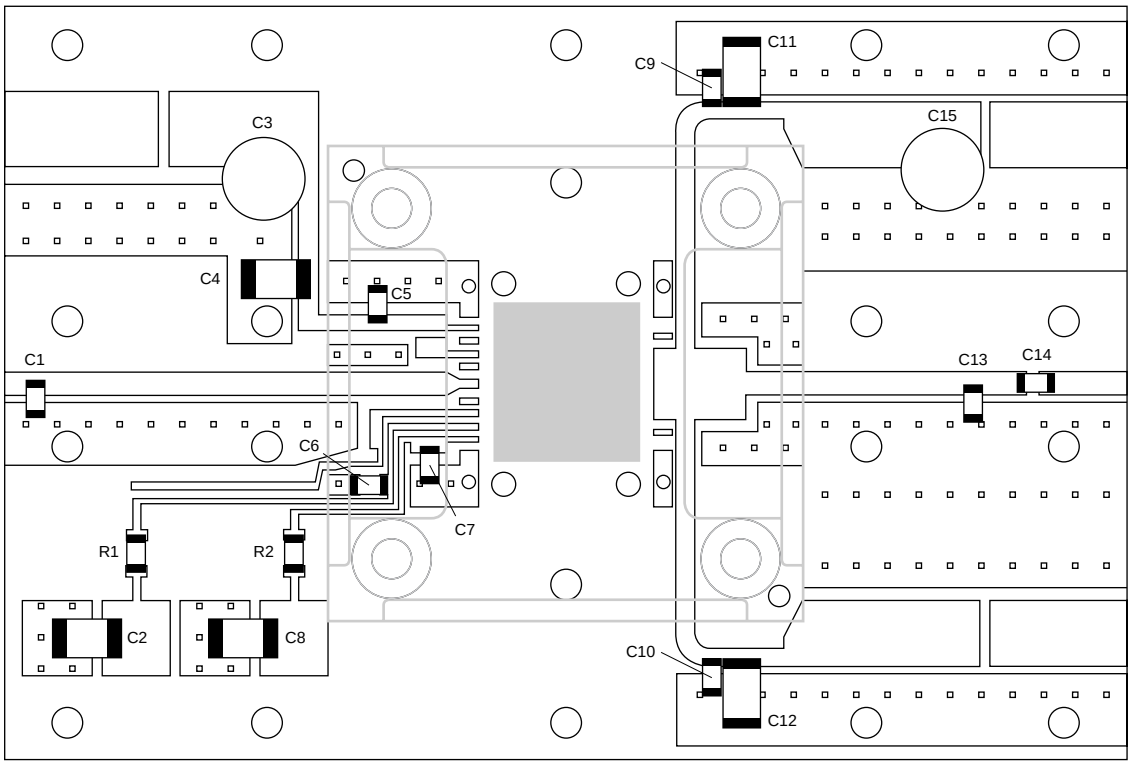
(2) T_{case} = 25 °C

(3) T_{case} = 85 °C

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

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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.

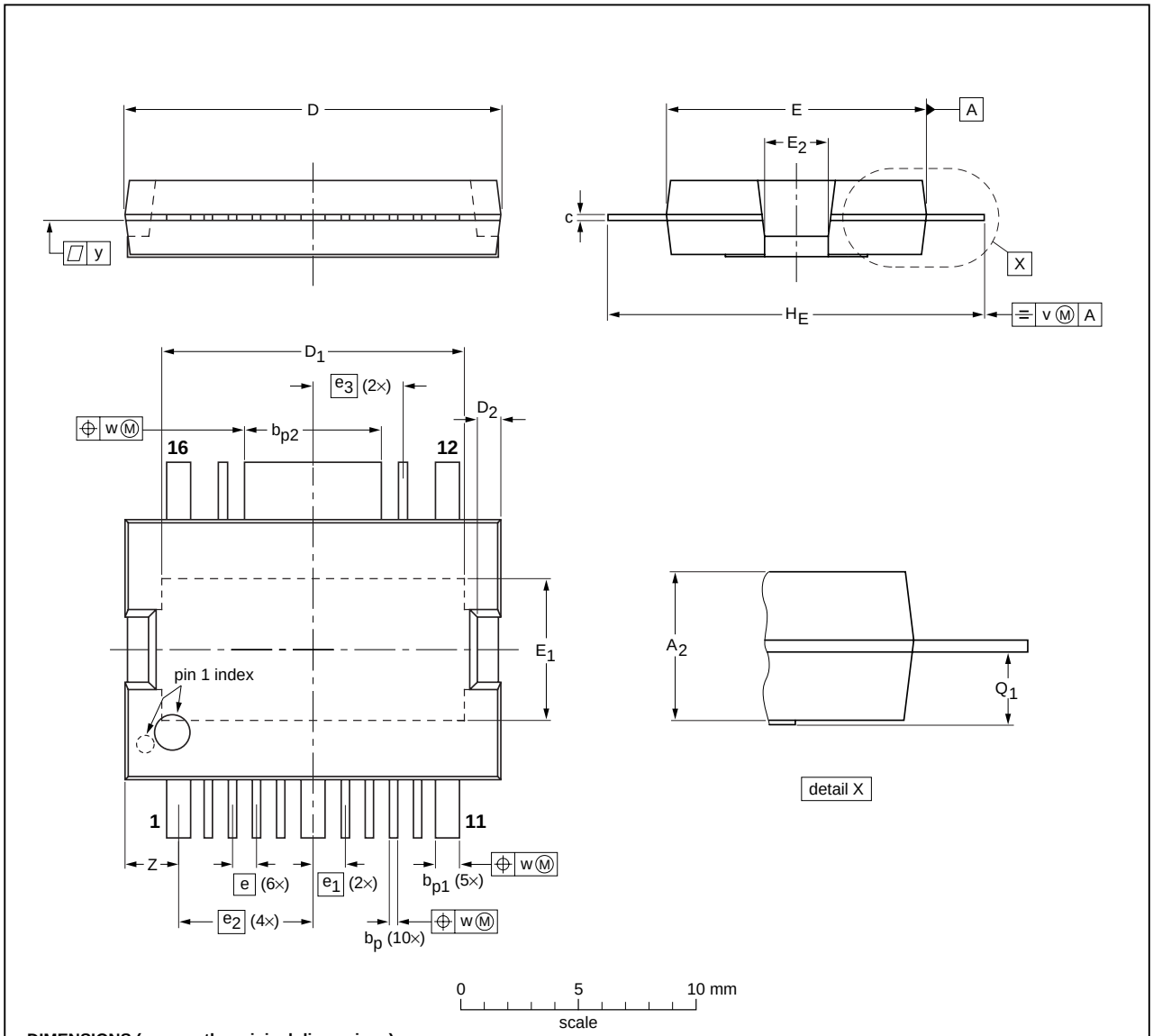
Component	Description	Value	Remarks
C1, C13	multilayer ceramic chip capacitor	0.3 pF	[1]
C2, C4, C8, C11, C12	multilayer ceramic chip capacitor	4.7 µF; 50 V	
C3, C15	electrolytic capacitor	220 µF; 35 V	
C5, C9, C10, C14	multilayer ceramic chip capacitor	10 pF	[1]
C6, C7	multilayer ceramic chip capacitor	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.

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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

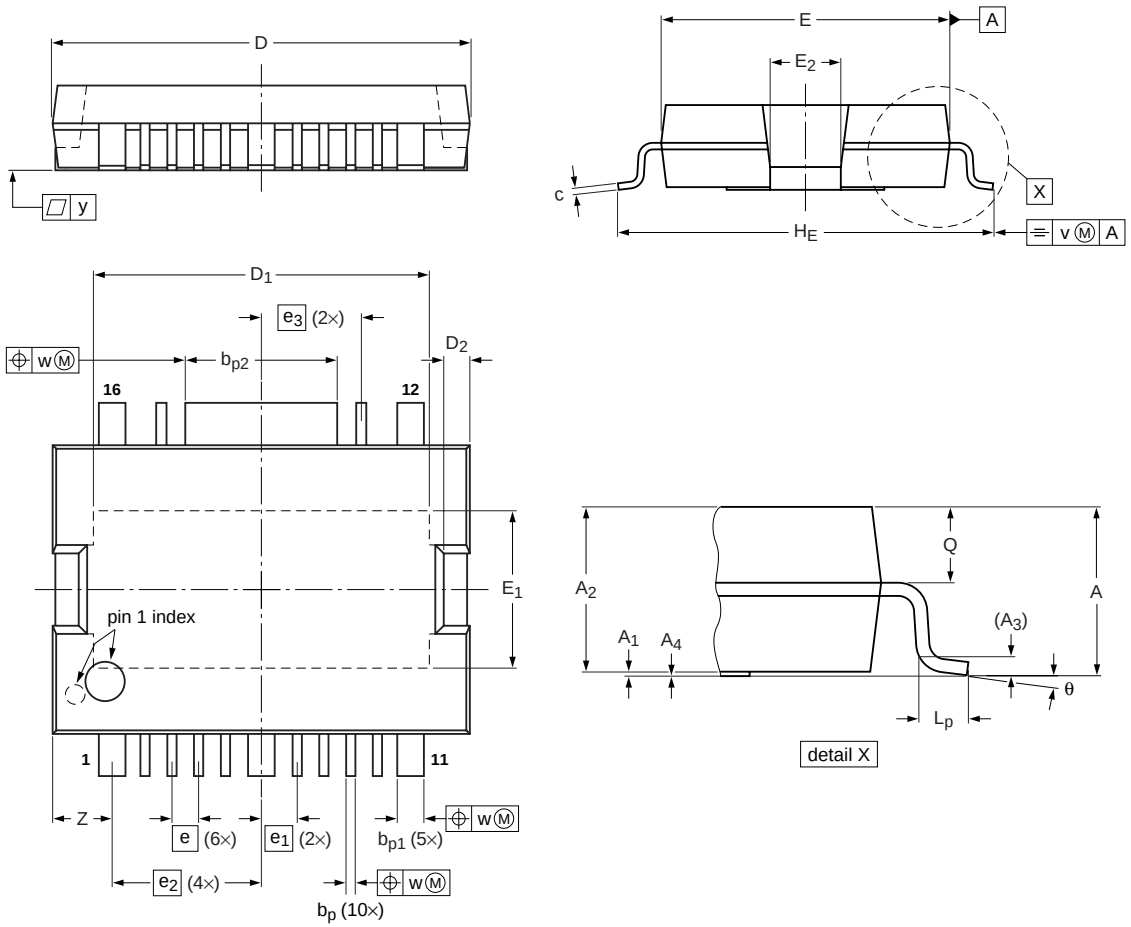
1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

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

Fig 11. Package outline SOT834-1 (HSOP16F)

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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)

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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	-	-

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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.
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[2] The term 'short data sheet' is explained in section "Definitions".

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