

# 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  $T_h = 25^\circ\text{C}$ .

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

[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



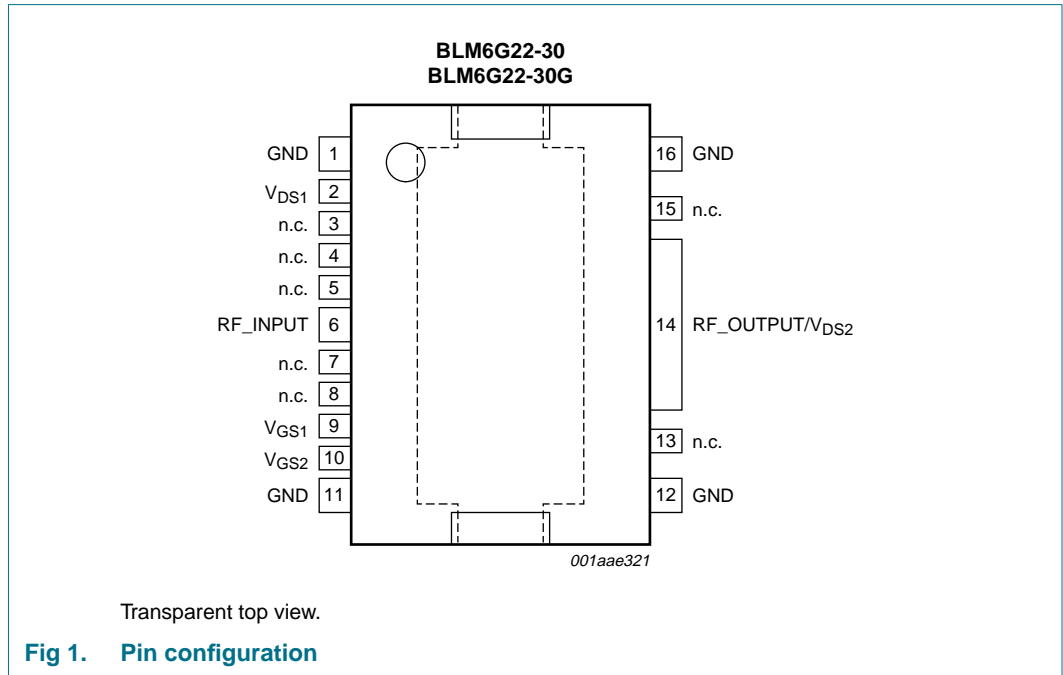
This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

### 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



### 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

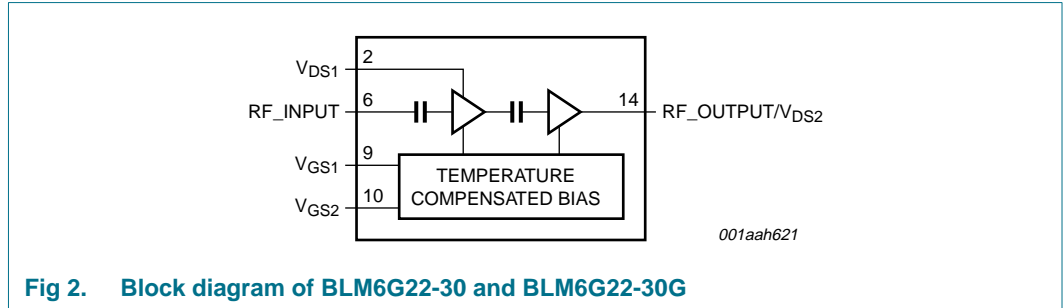


Fig 2. Block diagram of BLM6G22-30 and BLM6G22-30G

## 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	$T_{case} = 25\text{ °C}$ ; $P_L = 2\text{ W}$ ; 2-carrier W-CDMA	[1] 3.9	K/W
$R_{th(j-c)2}$	second stage thermal resistance from junction to case	$T_{case} = 25\text{ °C}$ ; $P_L = 2\text{ W}$ ; 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
$\eta_D$	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**

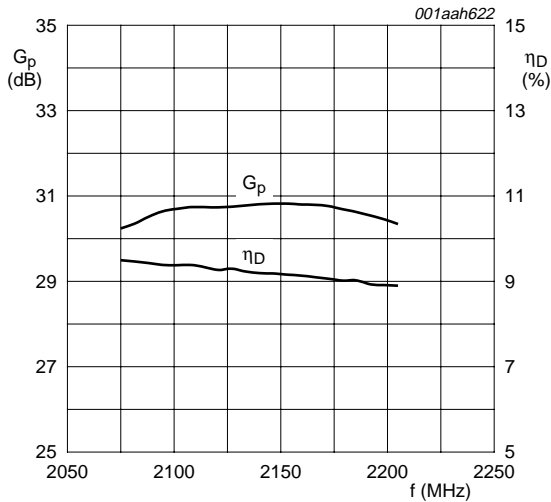
f	$Z_i$ <sup>[1]</sup>	$Z_L$ <sup>[2]</sup>
MHz	$\Omega$	$\Omega$
2075	40.9 + j22.8	18.0 – j5.5
2085	41.2 + j23.2	17.8 – j5.6
2095	41.6 + j23.3	17.7 – j5.7
2105	41.9 + j23.3	17.7 – j5.9
2115	42.1 + j23.3	17.6 – j6.0
2125	42.2 + j23.2	17.4 – j6.0
2135	42.4 + j23.1	17.3 – j6.1
2145	42.3 + j22.9	17.2 – 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.

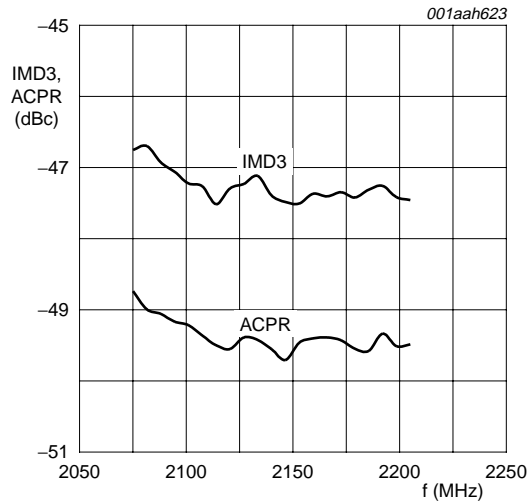
**8.3 Performance curves**

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



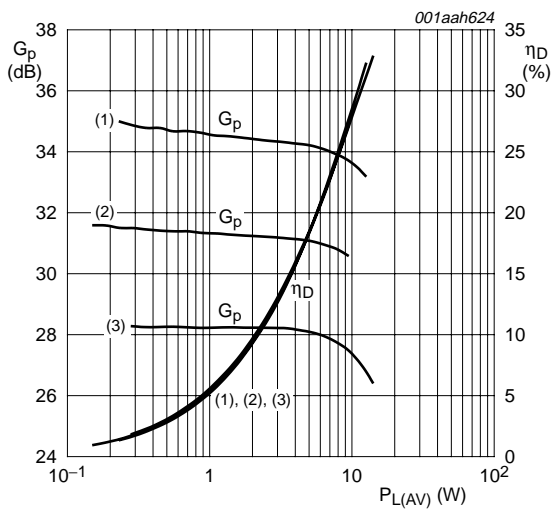
$T_{case} = 25\text{ }^\circ\text{C}$ ;  $V_{DS} = 28\text{ V}$ ;  $P_{L(AV)} = 2\text{ W}$ ;  $I_{DQ1} = 270\text{ mA}$ ;  $I_{DQ2} = 280\text{ mA}$ ; carrier spacing = 10 MHz.

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



$T_{case} = 25\text{ }^\circ\text{C}$ ;  $V_{DS} = 28\text{ V}$ ;  $P_{L(AV)} = 2\text{ W}$ ;  $I_{DQ1} = 270\text{ mA}$ ;  $I_{DQ2} = 280\text{ mA}$ ; carrier spacing = 10 MHz.

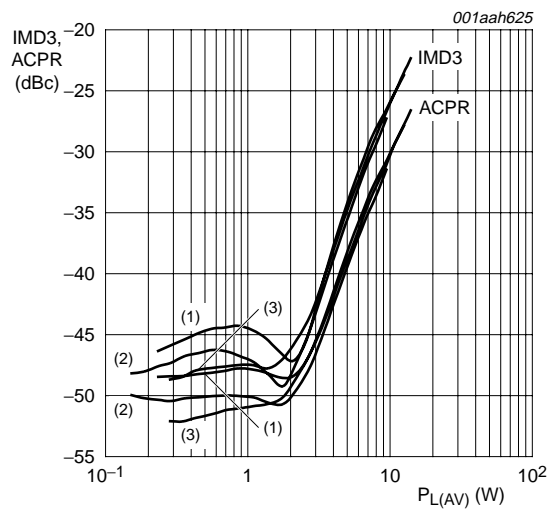
**Fig 4. 2-carrier W-CDMA adjacent power channel ratio and third order intermodulation distortion as functions of frequency; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{DQ1} = 270\text{ mA}$ ;  $I_{DQ2} = 280\text{ mA}$ ; carrier spacing = 10 MHz.

- (1)  $T_{case} = -30\text{ }^\circ\text{C}$
- (2)  $T_{case} = 25\text{ }^\circ\text{C}$
- (3)  $T_{case} = 85\text{ }^\circ\text{C}$

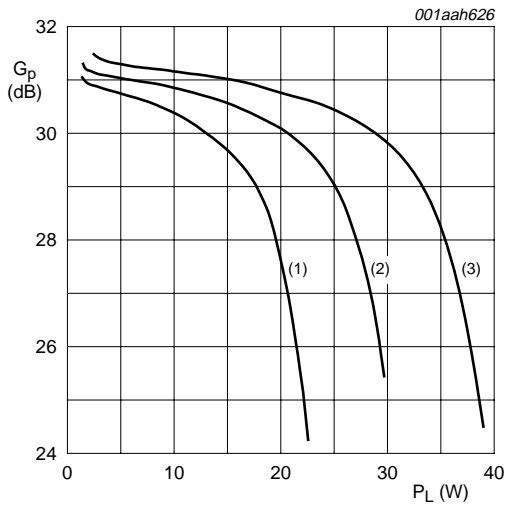
**Fig 5. 2-carrier W-CDMA power gain and drain efficiency as functions of average output power and temperature; typical values**



$V_{DS} = 28\text{ V}$ ;  $I_{DQ1} = 270\text{ mA}$ ;  $I_{DQ2} = 280\text{ mA}$ ; carrier spacing = 10 MHz.

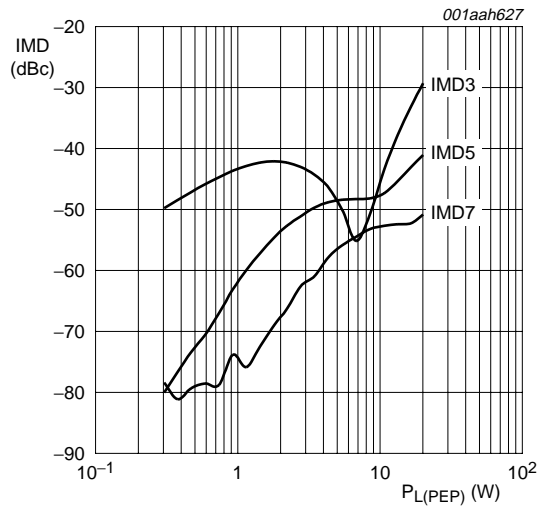
- (1)  $T_{case} = -30\text{ }^\circ\text{C}$
- (2)  $T_{case} = 25\text{ }^\circ\text{C}$
- (3)  $T_{case} = 85\text{ }^\circ\text{C}$

**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**



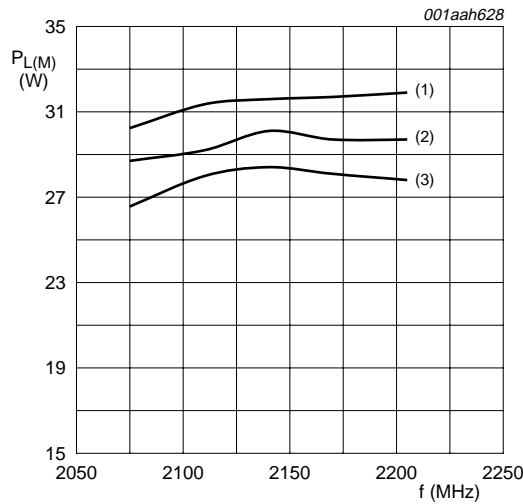
$f = 2140$  MHz;  $I_{DQ1} = 270$  mA;  $I_{DQ2} = 280$  mA.  
 (1)  $V_{DS} = 24$  V  
 (2)  $V_{DS} = 28$  V  
 (3)  $V_{DS} = 32$  V

**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.

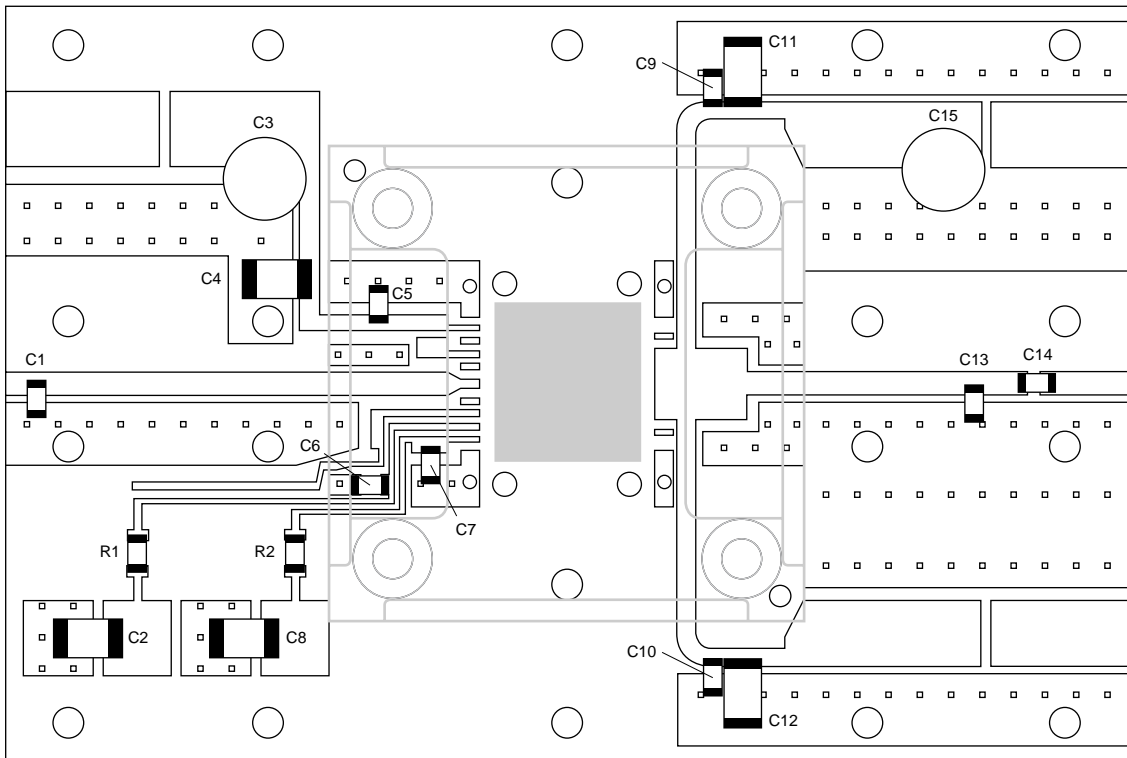
**Fig 8. Two-tone CW intermodulation distortion as function of peak envelope load power; typical value**



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**



001aah629

Striplines are on a double copper-clad Rogers 4350B Printed-Circuit Board (PCB) with  $\epsilon_r = 3.5$ ; 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 $\mu$ F; 50 V	
C3, C15	electrolytic capacitor	220 $\mu$ F; 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 k $\Omega$	
R2	SMD resistor 0805	3.9 k $\Omega$	

[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

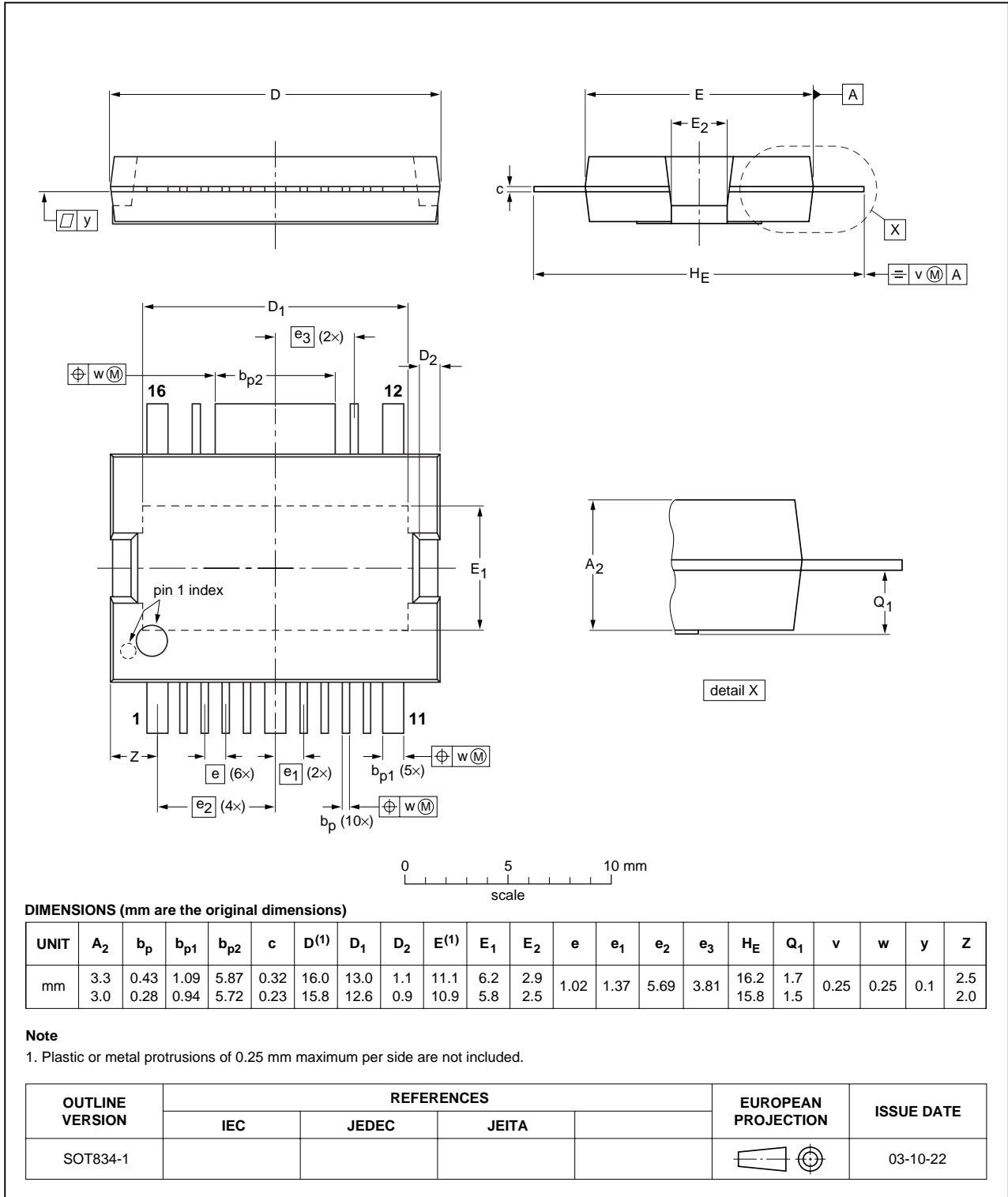


Fig 11. Package outline SOT834-1 (HSOP16F)



HSOP16: plastic, heatsink small outline package; 16 leads

SOT822-1

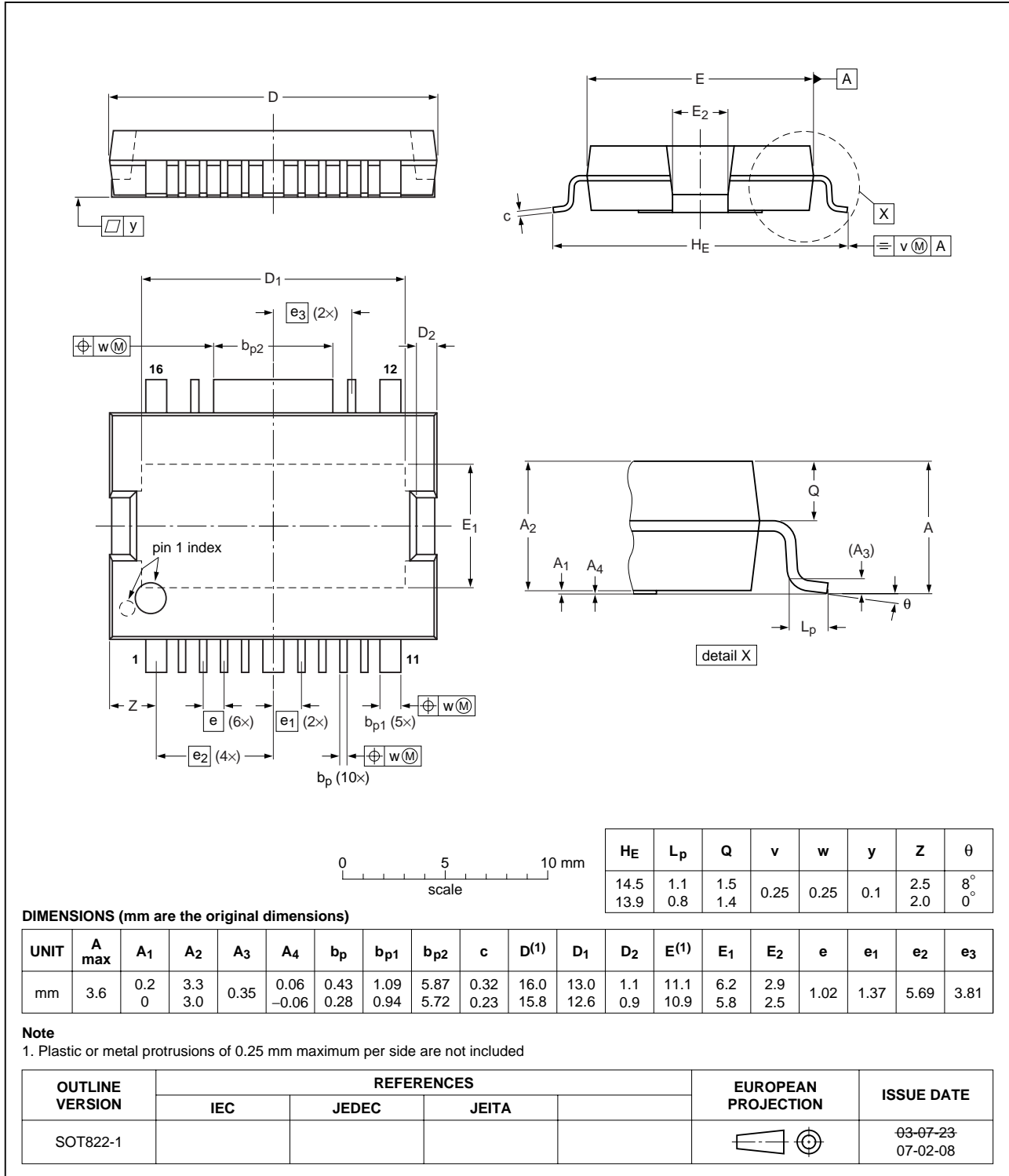


Fig 12. Package outline SOT822-1 (HSOP16)

## 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:	<ul style="list-style-type: none"> <li>• <a href="#">Figure 5</a>: updated</li> </ul>			
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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### 14.1 Data sheet status

Document status <sup>[1][2]</sup>	Product status <sup>[3]</sup>	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
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Product [short] data sheet	Production	This document contains the product specification.

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

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