

# BLF7G24L-140; BLF7G24LS-140

Power LDMOS transistor

Rev. 3 — 1 August 2011

Product data sheet

## 1. Product profile

### 1.1 General description

140 W LDMOS power transistor for base station applications at frequencies from 2300 MHz to 2400 MHz.

**Table 1. Typical performance**

Typical RF performance at  $T_{case} = 25\text{ }^{\circ}\text{C}$  in a common source class-AB production test circuit.

Mode of operation	f (MHz)	$I_{Dq}$ (mA)	$V_{DS}$ (V)	$P_{L(AV)}$ (W)	$G_p$ (dB)	$\eta_D$ (%)	ACPR <sub>885k</sub> (dBc)	ACPR <sub>5M</sub> (dBc)
IS-95	2300 to 2400	1300	28	30	18.5	26.5	-45 <sup>[1]</sup>	
1 carrier W-CDMA	2300 to 2400	1300	28	50	18.5	33	-	-35 <sup>[2]</sup>

[1] Single carrier IS-95 with pilot, paging, sync and 6 traffic channels (Walsh codes 8 - 13). PAR = 9.7 dB at 0.01 % probability on the CCDF. Channel bandwidth is 1.2288 MHz.

[2] 3GPP; test model 1; 64 DPCH; PAR = 7.2 dB at 0.01 % probability on CCDF. Channel bandwidth is 3.84 MHz.

### 1.2 Features and benefits

- Excellent ruggedness
- High efficiency
- Low  $R_{th}$  providing excellent thermal stability
- Designed for low memory effects providing excellent digital pre-distortion capability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

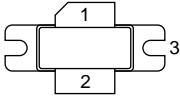
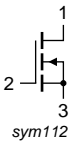
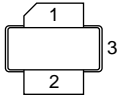
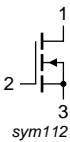
### 1.3 Applications

- RF power amplifiers for base stations and multi carrier applications in the 2300 MHz to 2400 MHz frequency range



## 2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
<b>BLF7G24L-140 (SOT502A)</b>			
1	drain		
2	gate		
3	source		
<b>BLF7G24LS-140 (SOT502B)</b>			
1	drain		
2	gate		
3	source		

[1] Connected to flange.

## 3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF7G24L-140	-	flanged LDMOST ceramic package; 2 mounting holes; 2 leads	SOT502A
BLF7G24LS-140	-	earless flanged LDMOST ceramic package; 2 leads	SOT502B

## 4. 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
$I_D$	drain current		-	28	A
$T_{stg}$	storage temperature		-65	+150	°C
$T_j$	junction temperature		-	200	°C

## 5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}; P_L = 125\text{ W}$	0.28	K/W

**6. Characteristics**

**Table 6. Characteristics**

$T_j = 25\text{ °C}$  unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 1\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 216\text{ mA}$	1.5	1.8	2.3	V
$I_{DSS}$	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	5	$\mu\text{A}$
$I_{DSX}$	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	34	42	-	A
$I_{GSS}$	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	500	nA
$g_{fs}$	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 216\text{ mA}$	-	1.87	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 7.56\text{ A}$	-	69	-	$\text{m}\Omega$

**7. Test information**

**Remark:** All testing performed in a class-AB production test circuit.

**Table 7. Functional test information**

Mode of operation: 1-carrier N-CDMA, single carrier IS-95 with pilot, paging, sync and 6 traffic channels (Walsh codes 8 - 13). PAR = 9.7 dB at 0.01 % probability on the CCDF, channel bandwidth is 1.2288 MHz;  $f_1 = 2300\text{ MHz}; f_2 = 2400\text{ MHz};$  RF performance at  $V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}; T_{case} = 25\text{ °C};$  unless otherwise specified.

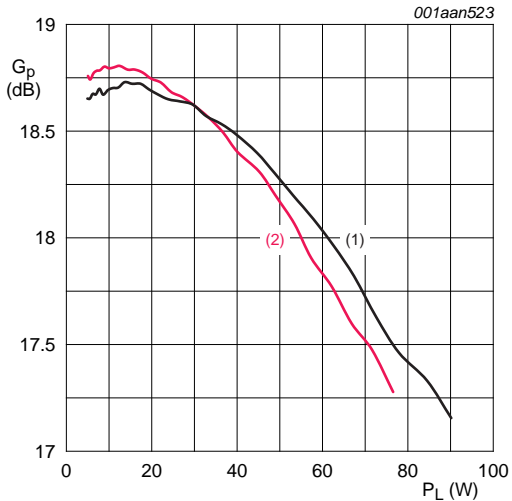
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	30	-	W
$G_p$	power gain		17.5	18.5	-	dB
$RL_{in}$	input return loss		-	-12	-	dB
$\eta_D$	drain efficiency		23	26.5	-	%
$ACPR_{885k}$	adjacent channel power ratio (885 kHz)		-	-45	-40	dBc

**7.1 Ruggedness in class-AB operation**

The BLF7G24L-140 and BLF7G24LS-140 are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions:  $V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}; P_L = 140\text{ W (CW)}; f = 2300\text{ MHz}.$

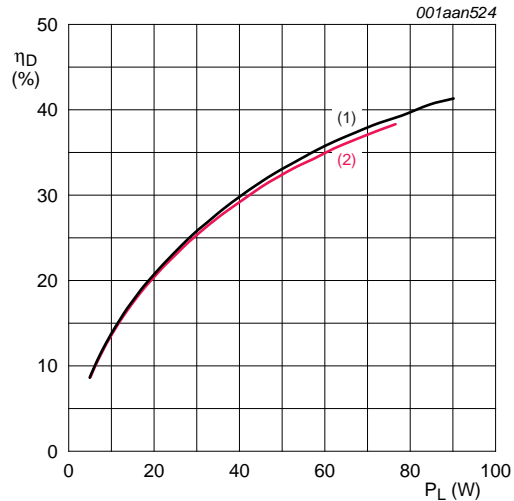
**7.2 Single carrier IS-95**

Single carrier IS-95 with pilot, paging, sync and 6 traffic channels (Walsh codes 8 - 13).  
 PAR = 9.7 dB at 0.01 % probability on the CCDF. Channel bandwidth is 1.2288 MHz



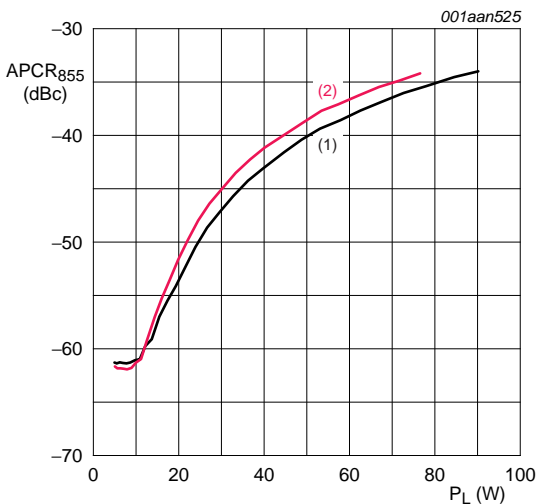
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2300\text{ MHz}$   
 (2)  $f = 2400\text{ MHz}$

**Fig 1. Single carrier IS-95 power gain as a function of load power; typical values**



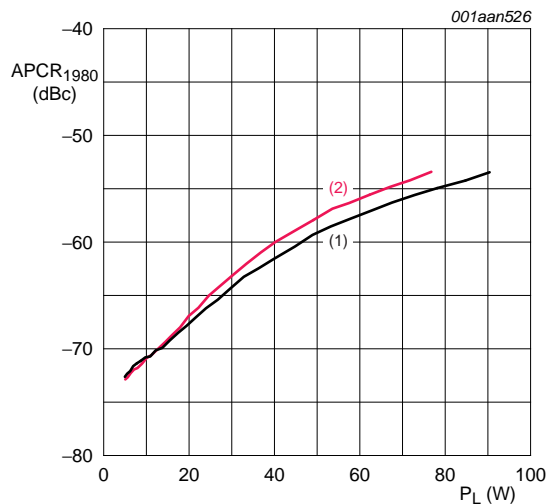
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2300\text{ MHz}$   
 (2)  $f = 2400\text{ MHz}$

**Fig 2. Single carrier IS-95 drain efficiency as a function of load power; typical values**



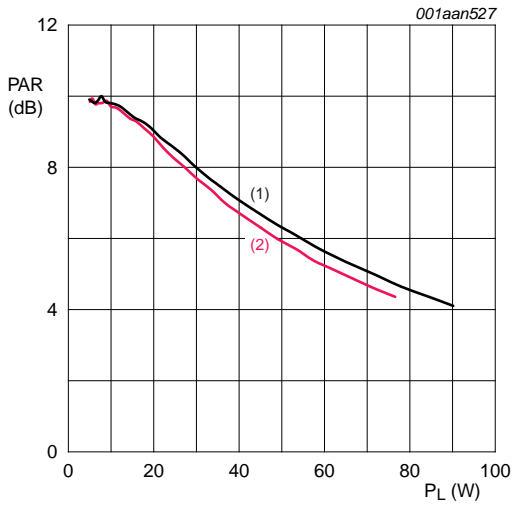
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2300\text{ MHz}$   
 (2)  $f = 2400\text{ MHz}$

**Fig 3. Single carrier IS-95 ACPR at 885 kHz as a function of load power; typical values**



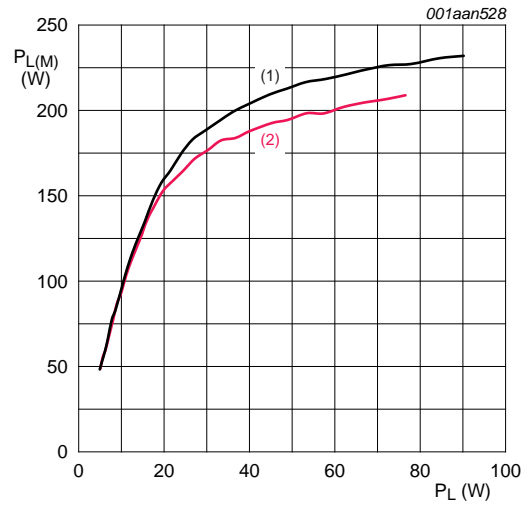
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2300\text{ MHz}$   
 (2)  $f = 2400\text{ MHz}$

**Fig 4. Single carrier IS-95 ACPR at 1980 kHz as a function of load power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2300\text{ MHz}$   
 (2)  $f = 2400\text{ MHz}$

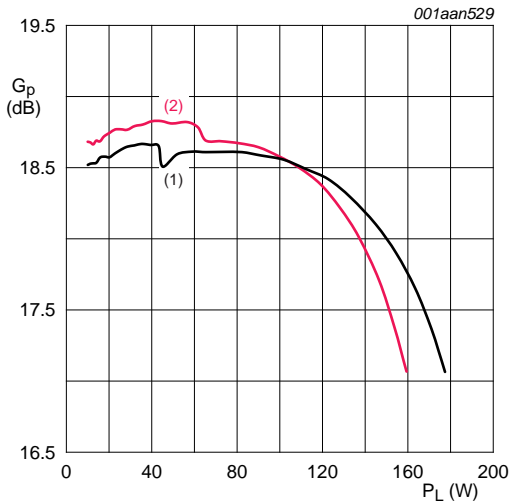
**Fig 5. Single carrier IS-95 peak-to-average power ratio as a function of load power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2300\text{ MHz}$   
 (2)  $f = 2400\text{ MHz}$

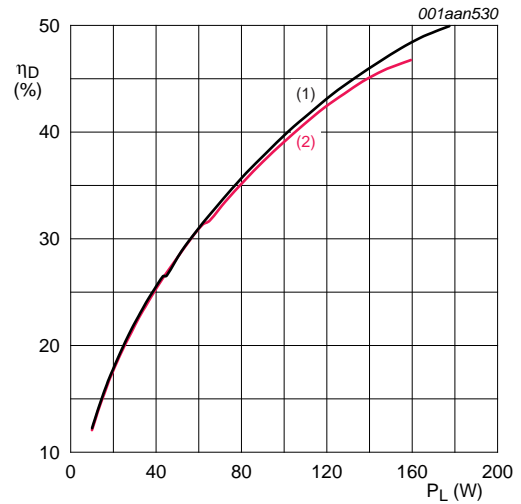
**Fig 6. Single carrier IS-95 peak power as a function of load power; typical values**

**7.3 Pulsed CW**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2300\text{ MHz}$   
 (2)  $f = 2400\text{ MHz}$

**Fig 7. Pulsed CW power gain as a function of load power; typical values**

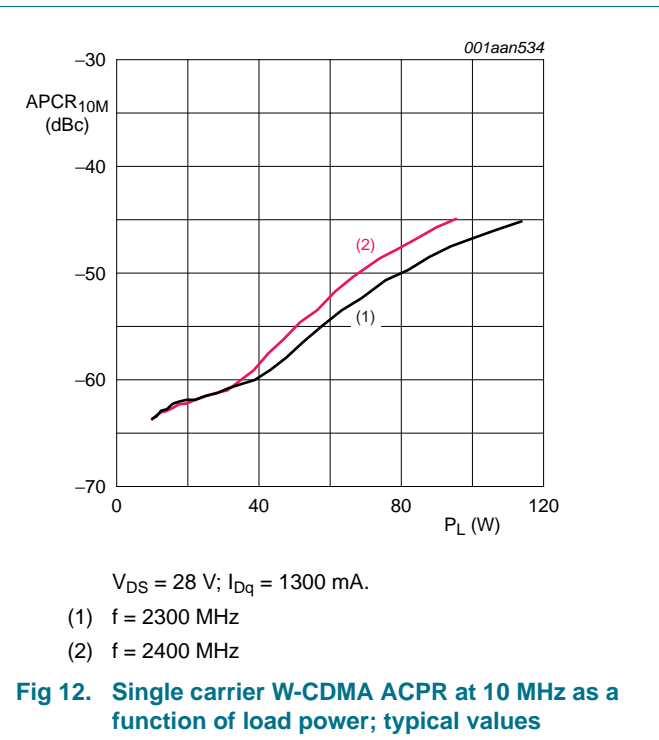
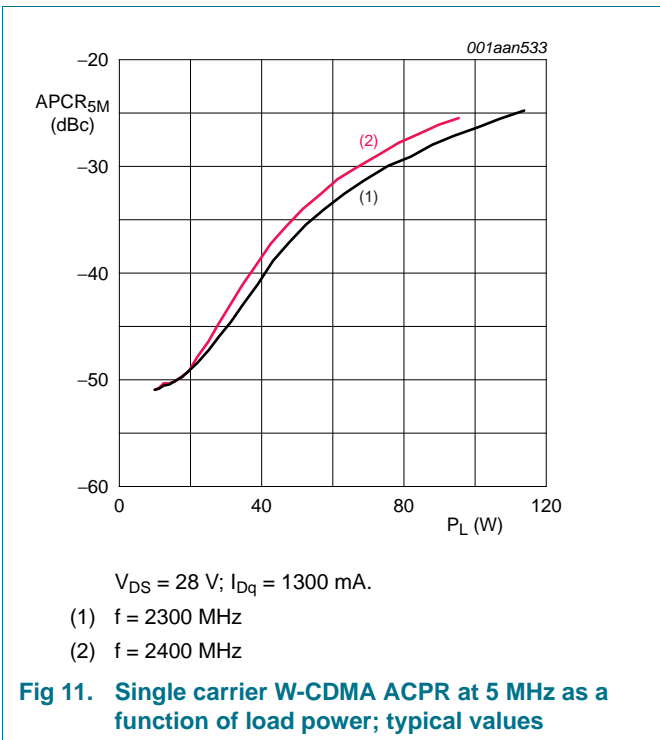
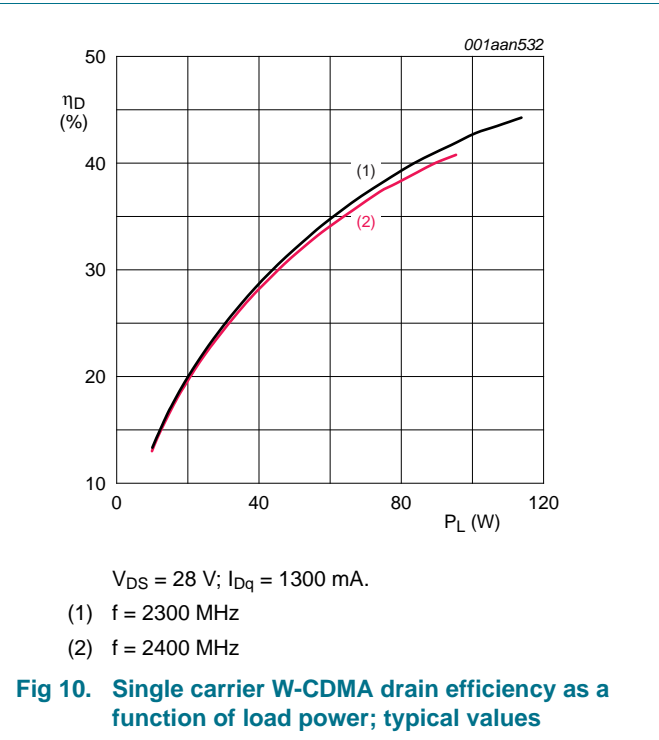
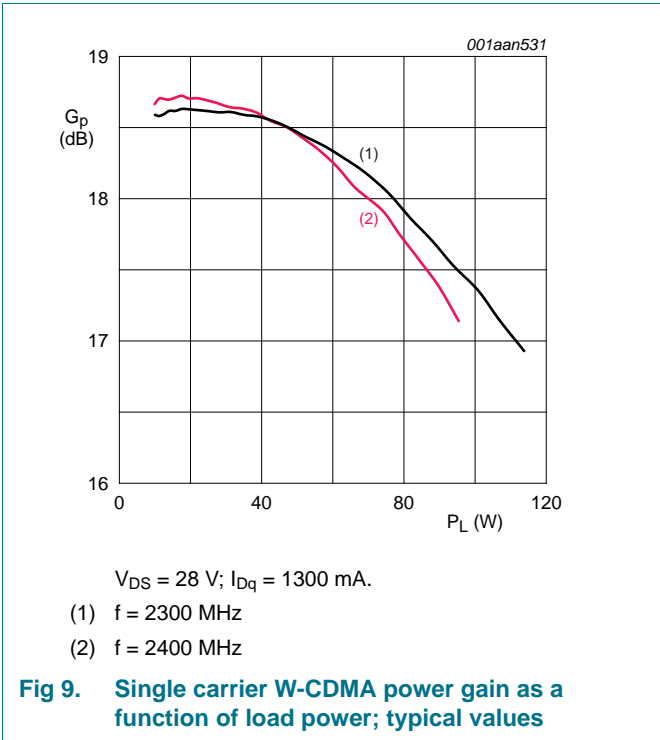


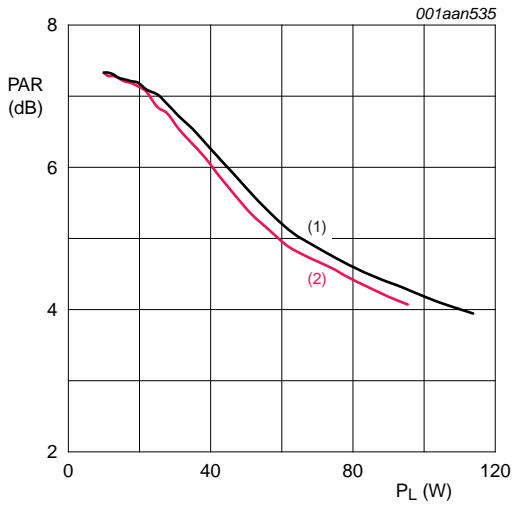
$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2300\text{ MHz}$   
 (2)  $f = 2400\text{ MHz}$

**Fig 8. Pulsed CW drain efficiency as a function of load power; typical values**

**7.4 Single carrier W-CDMA**

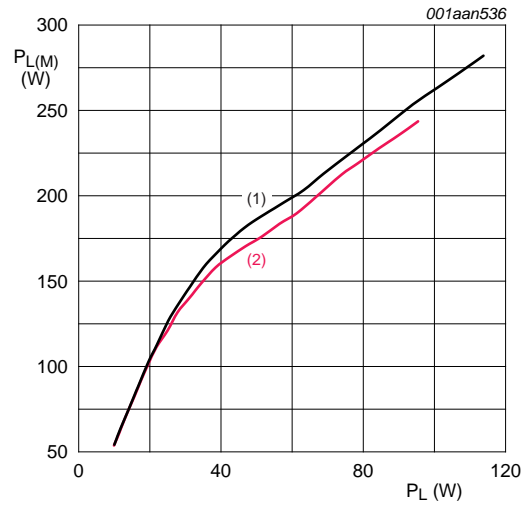
3GPP; test model 1; 64 DPCH; PAR = 7.2 dB at 0.01 % probability on CCDF. Channel bandwidth is 3.84 MHz.





$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2300\text{ MHz}$   
 (2)  $f = 2400\text{ MHz}$

**Fig 13. Single carrier W-CDMA peak-to-average power ratio as a function of load power; typical values**



$V_{DS} = 28\text{ V}; I_{Dq} = 1300\text{ mA}$ .  
 (1)  $f = 2300\text{ MHz}$   
 (2)  $f = 2400\text{ MHz}$

**Fig 14. Single carrier W-CDMA peak output power as a function of load power; typical values**



8. Package outline

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads

SOT502A

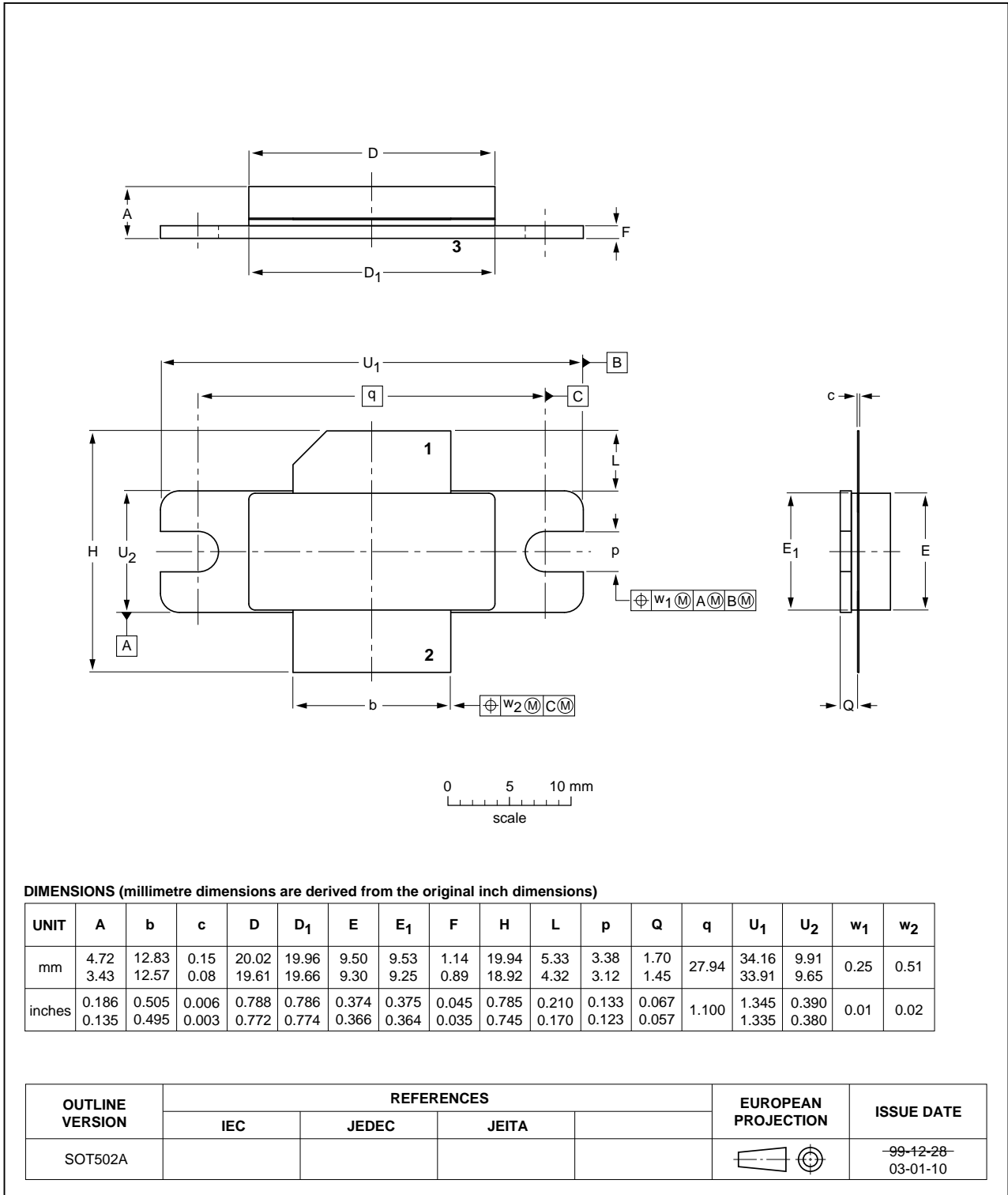


Fig 15. Package outline SOT502A

Earless flanged LDMOST ceramic package; 2 leads

SOT502B

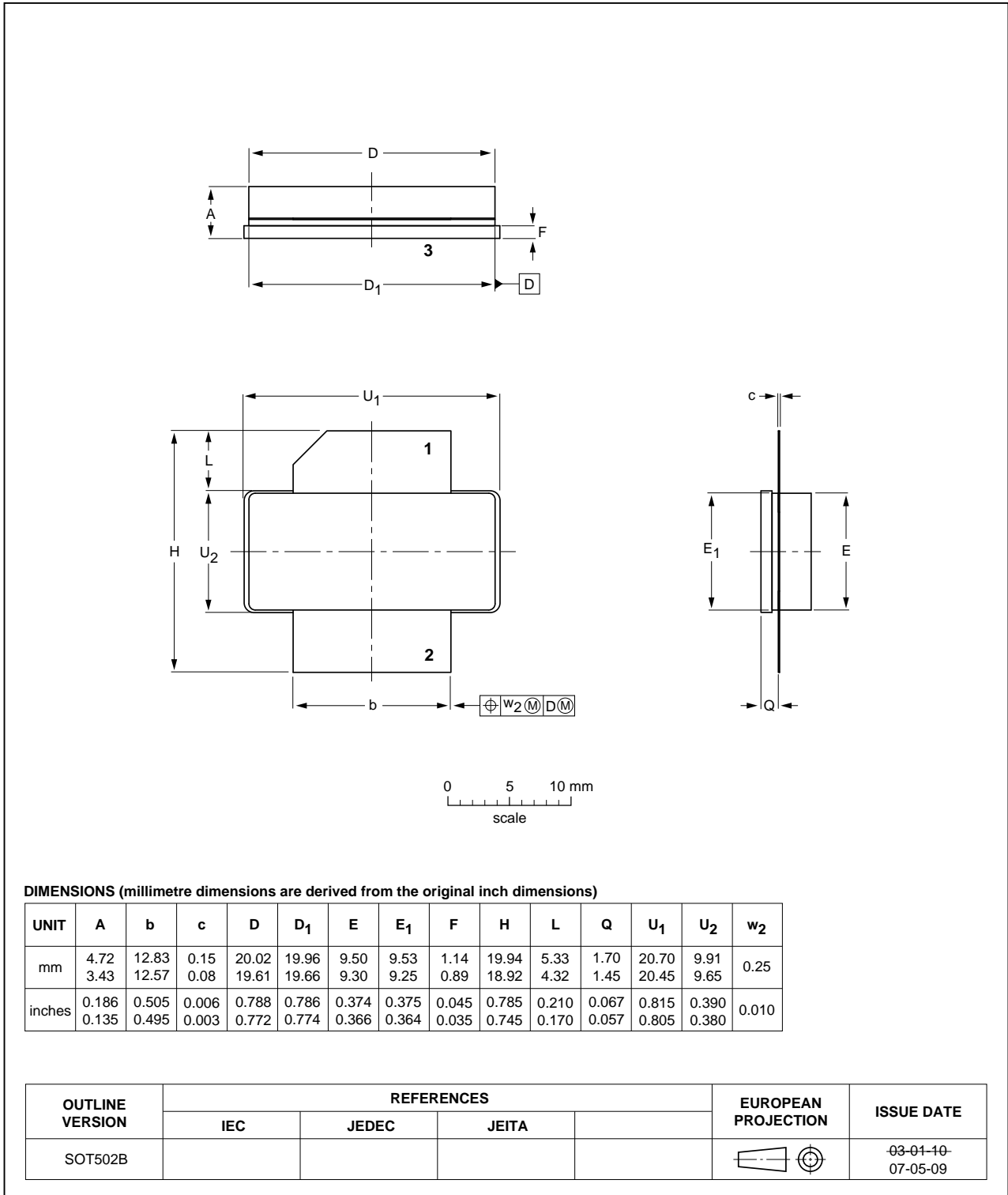


Fig 16. Package outline SOT502B

## 9. Abbreviations

**Table 8. 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
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal Oxide Semiconductor
LDMOST	Laterally Diffused Metal Oxide Semiconductor Transistor
N-CDMA	Narrowband Code Division Multiple Access
PAR	Peak-to-Average power Ratio
RF	Radio Frequency
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

## 10. Revision history

**Table 9. Revision history**

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF7G24L-140_7G24LS-140 v.3	20110801	Product data sheet	-	BLF7G24L-140_7G24LS-140 v.2
Modifications:	<ul style="list-style-type: none"> <li>The status of this data sheet has been changed to Product data sheet</li> </ul>			
BLF7G24L-140_7G24LS-140 v.2	20110405	Preliminary data sheet	-	BLF7G24L-140_7G24LS-140 v.1
BLF7G24L-140_7G24LS-140 v.1	20100805	Objective data sheet	-	-

## 11. Legal information

### 11.1 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.
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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## 13. Contents

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<b>1</b>	<b>Product profile</b> . . . . .	<b>1</b>
1.1	General description . . . . .	1
1.2	Features and benefits . . . . .	1
1.3	Applications . . . . .	1
<b>2</b>	<b>Pinning information</b> . . . . .	<b>2</b>
<b>3</b>	<b>Ordering information</b> . . . . .	<b>2</b>
<b>4</b>	<b>Limiting values</b> . . . . .	<b>2</b>
<b>5</b>	<b>Thermal characteristics</b> . . . . .	<b>2</b>
<b>6</b>	<b>Characteristics</b> . . . . .	<b>3</b>
<b>7</b>	<b>Test information</b> . . . . .	<b>3</b>
7.1	Ruggedness in class-AB operation . . . . .	3
7.2	Single carrier IS-95 . . . . .	4
7.3	Pulsed CW . . . . .	6
7.4	Single carrier W-CDMA . . . . .	7
<b>8</b>	<b>Package outline</b> . . . . .	<b>9</b>
<b>9</b>	<b>Abbreviations</b> . . . . .	<b>11</b>
<b>10</b>	<b>Revision history</b> . . . . .	<b>11</b>
<b>11</b>	<b>Legal information</b> . . . . .	<b>12</b>
11.1	Data sheet status . . . . .	12
11.2	Definitions . . . . .	12
11.3	Disclaimers . . . . .	12
11.4	Trademarks . . . . .	13
<b>12</b>	<b>Contact information</b> . . . . .	<b>13</b>
<b>13</b>	<b>Contents</b> . . . . .	<b>14</b>

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