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 °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)	η_D (%)	$ACPR_{885k}$ (dBc)	$ACPR_{5M}$ (dBc)
IS-95	2300 to 2400	1300	28	30	18.5	26.5	–45[1]	
1 carrier W-CDMA	2300 to 2400	1300	28	50	18.5	33	-	–35[2]

[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

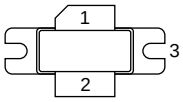
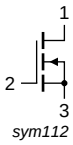
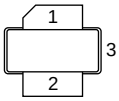
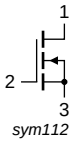
- Excellent ruggedness
- High efficiency
- Low R_{th} providing excellent thermal stability
- Designed for low memory effects providing excellent digital pre-distortion capability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction 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
BLF7G24L-140 (SOT502A)				
1	drain			
2	gate			
3	source	[1]		
BLF7G24LS-140 (SOT502B)				
1	drain			
2	gate			
3	source	[1]		

sym112

[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 °C; P_L = 125 W	0.28	K/W

6. Characteristics

Table 6. Characteristics

T_j = 25 °C unless otherwise specified.

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

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 MHz; f_2 = 2400 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 1300 mA; T_{case} = 25 °C; unless otherwise specified.

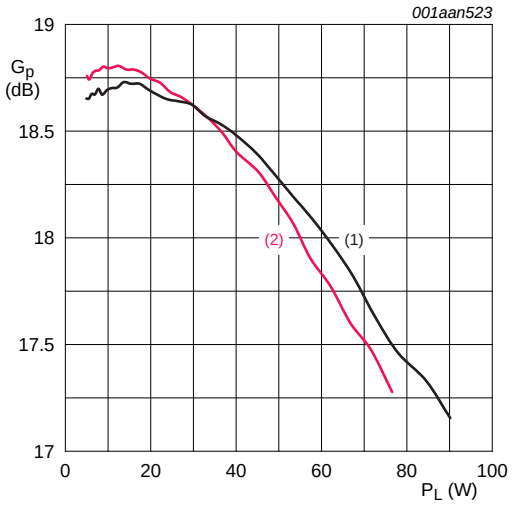
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	30	-	W
G_p	power gain		17.5	18.5	-	dB
RL_{in}	input return loss		-	–12	-	dB
η_D	drain efficiency		23	26.5	-	%
$ACPR_{885k}$	adjacent channel power ratio (885 kHz)		-	–45	–40	dBc

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 V; I_{Dq} = 1300 mA; P_L = 140 W (CW); f = 2300 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

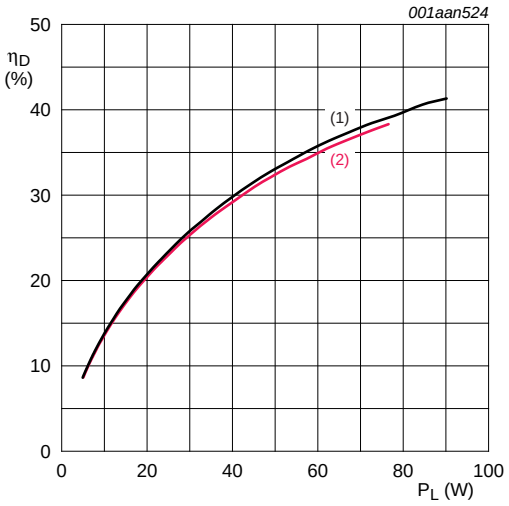


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

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

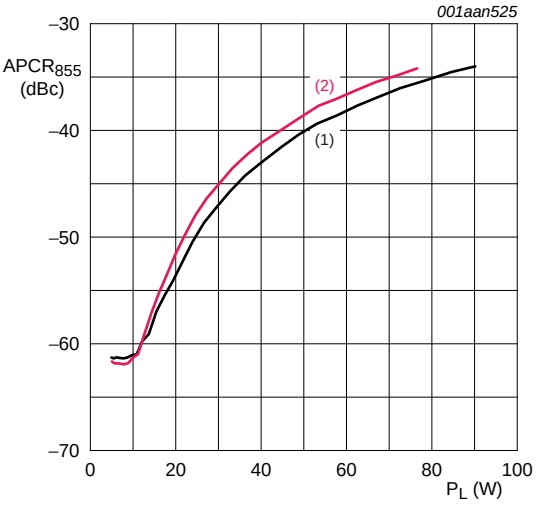


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

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

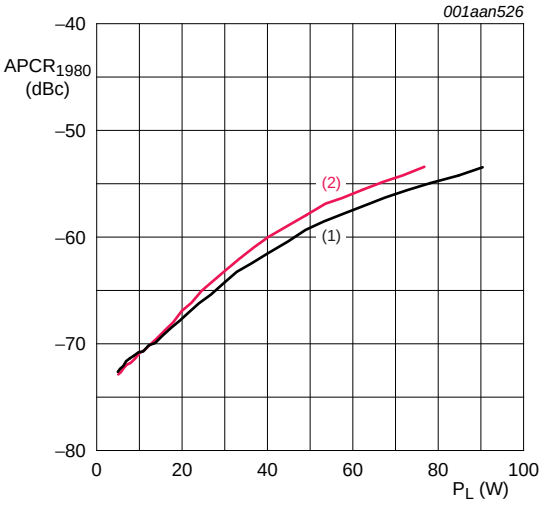


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

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

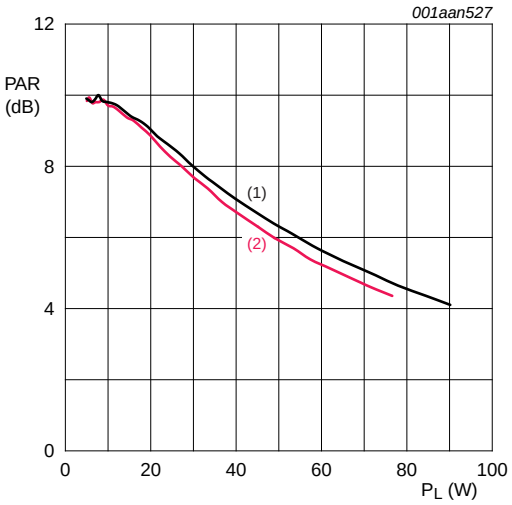


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

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

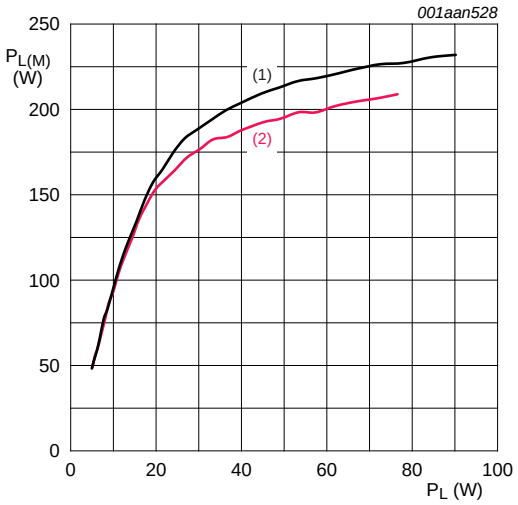


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

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



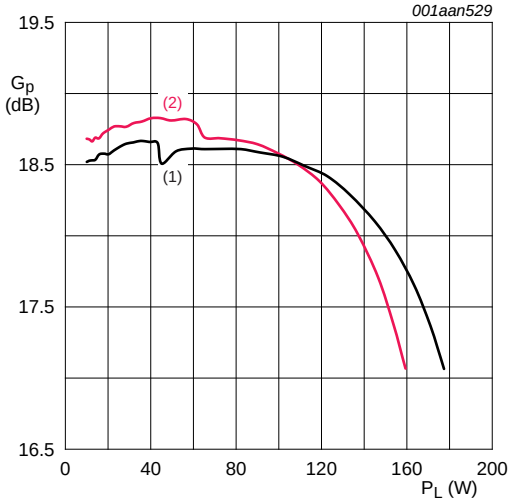
V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

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

7.3 Pulsed CW

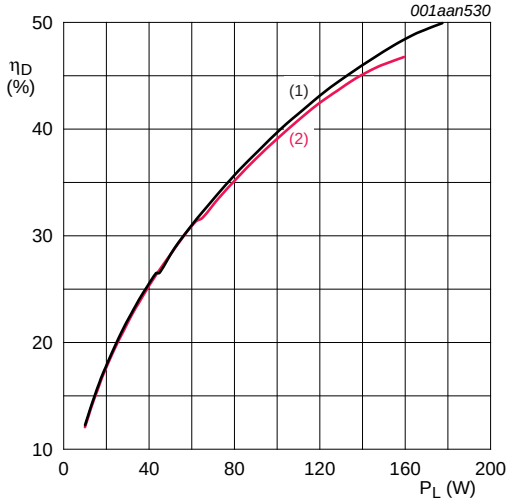


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

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



V_{DS} = 28 V; I_{Dq} = 1300 mA.

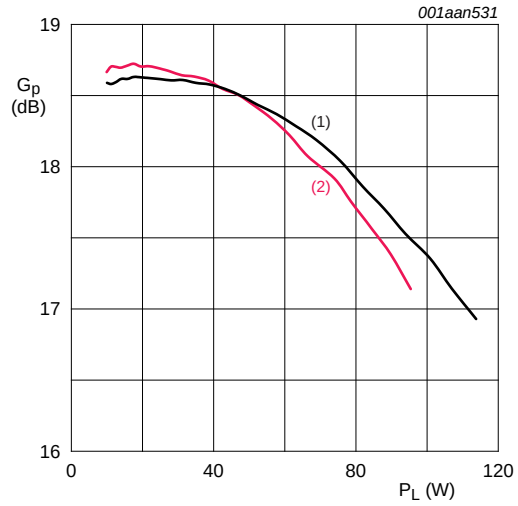
(1) f = 2300 MHz

(2) f = 2400 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.

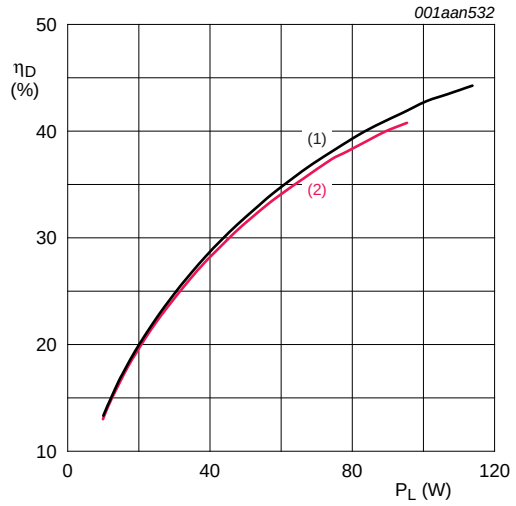


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

Fig 9. Single carrier W-CDMA power gain as a function of load power; typical values

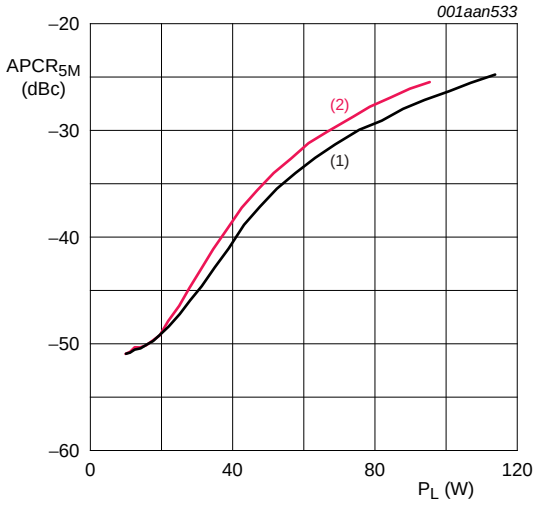


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

Fig 10. Single carrier W-CDMA drain efficiency as a function of load power; typical values

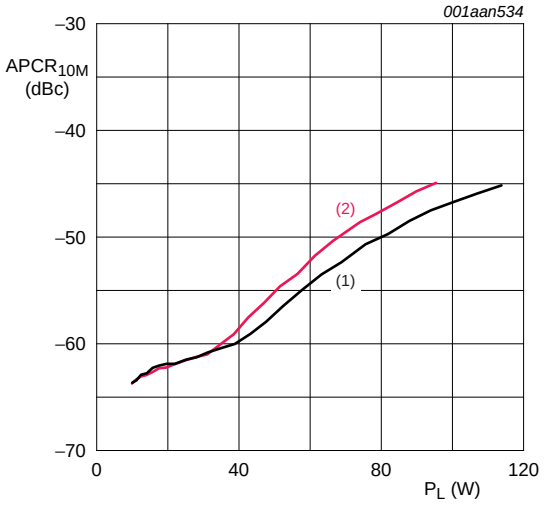


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

Fig 11. Single carrier W-CDMA ACPR at 5 MHz as a function of load power; typical values

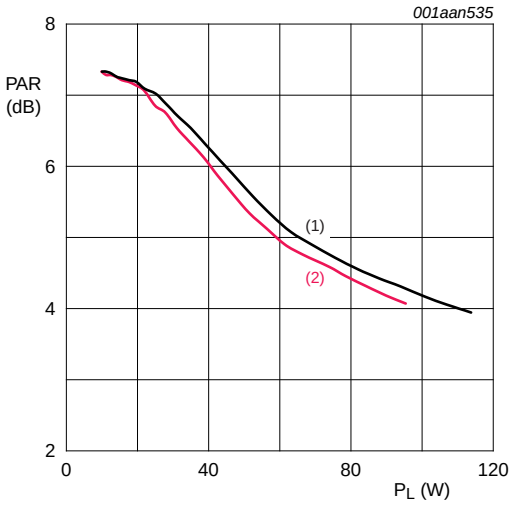


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

Fig 12. Single carrier W-CDMA ACPR at 10 MHz as a function of load power; typical values

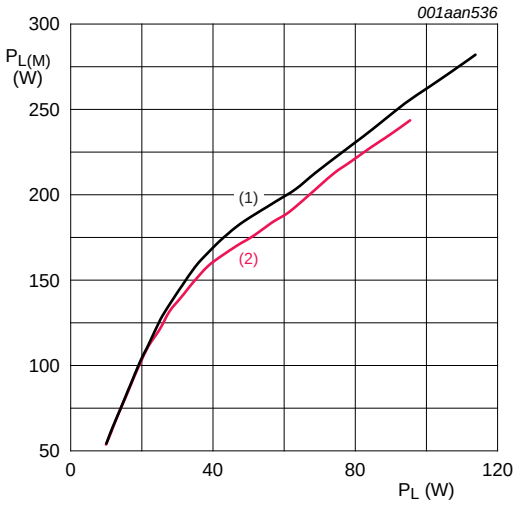


V_{DS} = 28 V; I_{Dq} = 1300 mA.

(1) f = 2300 MHz

(2) f = 2400 MHz

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



V_{DS} = 28 V; I_{Dq} = 1300 mA.

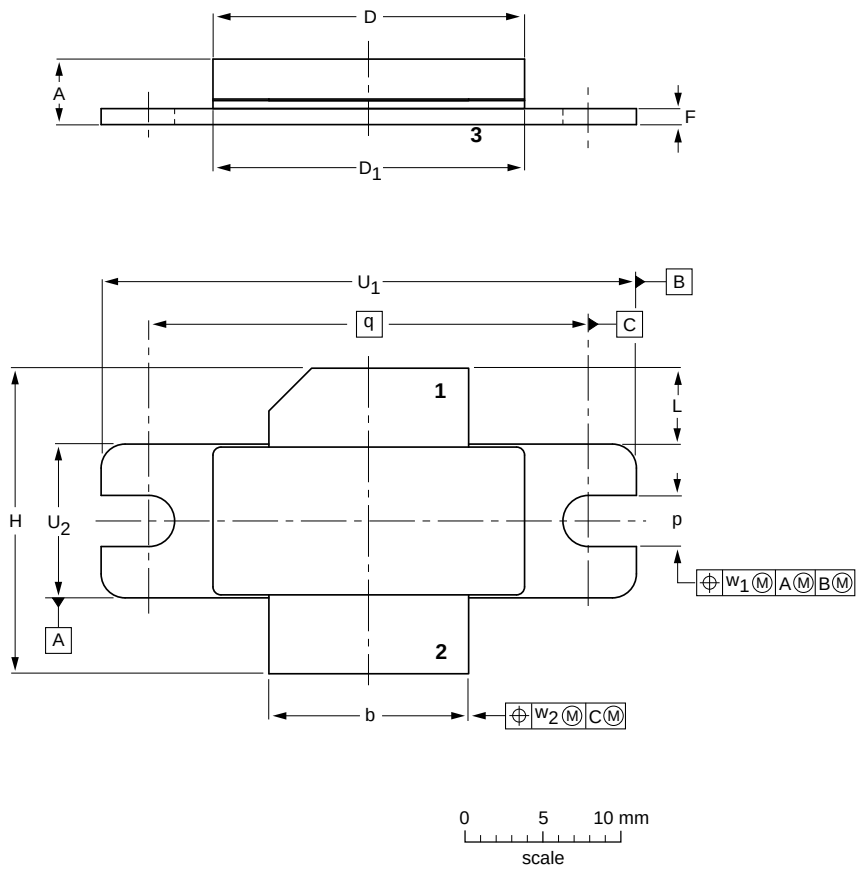
(1) f = 2300 MHz

(2) f = 2400 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**



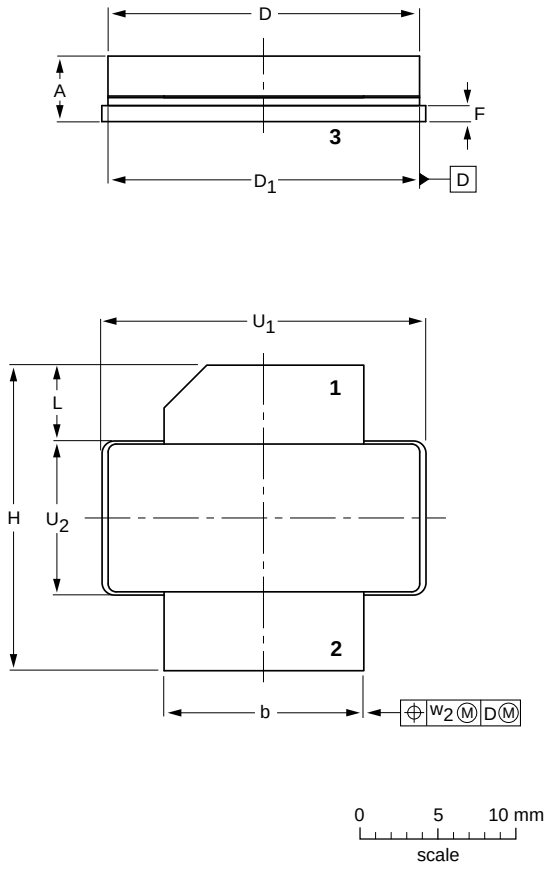
DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	L	p	Q	q	U_1	U_2	w_1	w_2
mm	4.72 3.43	12.83 12.57	0.15 0.08	20.02 19.61	19.96 19.66	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	5.33 4.32	3.38 3.12	1.70 1.45	27.94	34.16 33.91	9.91 9.65	0.25	0.51
inches	0.186 0.135	0.505 0.495	0.006 0.003	0.788 0.772	0.786 0.774	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.210 0.170	0.133 0.123	0.067 0.057	1.100	1.345 1.335	0.390 0.380	0.01	0.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT502A						~~99-12-28~~ 03-01-10

Fig 15. Package outline SOT502A

Earless flanged LDMOST ceramic package; 2 leads **SOT502B**



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	L	Q	U_1	U_2	w_2
mm	4.72 3.43	12.83 12.57	0.15 0.08	20.02 19.61	19.96 19.66	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	5.33 4.32	1.70 1.45	20.70 20.45	9.91 9.65	0.25
inches	0.186 0.135	0.505 0.495	0.006 0.003	0.788 0.772	0.786 0.774	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.210 0.170	0.067 0.057	0.815 0.805	0.390 0.380	0.010

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT502B						~~03-01-10~~ 07-05-09

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:	• The status of this data sheet has been changed to Product data sheet			
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[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.nxp.com.

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13. Contents

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Date of release: 1 August 2011
Document identifier: BLF7G24L-140_7G24LS-140