BLF8G20LS-200V

Power LDMOS transistor

Rev. 1 — 4 July 2012 Objective data sheet

1. Product profile

1.1 General description

200 W LDMOS power transistor for base station applications at frequencies from 1800 MHz to 2000 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	I_{Dq}	V_{DS}	$P_{L(AV)}$	G_p	η_D	ACPR
	(MHz)	(mA)	(V)	(W)	(dB)	(%)	(dBc)
2-carrier W-CDMA	1805 to 1880	1600	28	55	17.5	33	–29[1]

[1] Test signal: 3GPP test model 1; 64 DPCH; PAR = 8.4 dB at 0.01 % probability on CCDF; carrier spacing 5 MHz.

1.2 Features and benefits

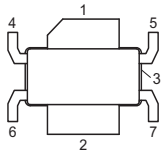
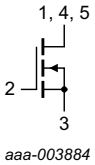
- Excellent ruggedness
- High efficiency
- Low R_{th} providing excellent thermal stability
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous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

1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 1800 MHz to 2000 MHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source [1]		
4,5	video decoupling		
6	n.c.		
7	n.c.		

aaa-003884

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G20LS-200V	-	earless flanged LDMOST ceramic package; 6 leads	SOT1120B

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
T_{stg}	storage temperature		−65	+150	°C
T_j	junction temperature		-	200	°C
T_{case}	case temperature	[1]	-	150	°C

[1] Continuous use at maximum temperature will affect MTTF

5. Recommended operating conditions

Table 5. Operating conditions

Symbol	Parameter	Conditions	Min	Max	Unit
T_{case}	case temperature		−40	+125	°C

6. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	T_{case} = 80 °C; P_L = 55 W	0.27	K/W

7. Characteristics

Table 7. Characteristics

T_j = 25 °C per section, unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0 V; I_D = 1.5 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 150 mA	1.5	1.9	2.3	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	4.2	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	42	50.6	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	−420	+2.44	+420	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 7.5 A	-	18.6	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 5.25 A	-	0.093	-	Ω

Table 8. RF characteristics

Mode of operation: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH; f_1 = 1807.5 MHz; f_2 = 1812.5 MHz; f_3 = 1872.5 MHz; f_4 = 1877.5 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 1600 mA; T_{case} = 25 °C; unless otherwise specified; in a production circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	55	-	W
G_p	power gain	$P_{L(AV)}$ = 55 W	16.5	17.5	-	dB
η_D	drain efficiency	$P_{L(AV)}$ = 55 W	29	33	-	%
RL_{in}	input return loss	$P_{L(AV)}$ = 55 W	-	-	−7	dB
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 55 W	-	−29	-	dBc

8. Test information

8.1 Ruggedness in class-AB operation

The BLF8G20LS-200V is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 28 V; I_{Dq} = 1600 mA; P_L = 200 W (CW); f = 1805 MHz.

8.2 Impedance information

Table 9. Typical impedance

Measured load-pull data; I_{Dq} = 1600 mA; V_{DS} = 28 V.

f	Z_S[1]	Z_L[1]
(MHz)	(Ω)	(Ω)
1805	1.01 – j3.66	1.04 – j2.44
1843	1.12 – j3.97	1.04 – j2.44
1880	1.37 – j4.20	1.04 – j2.44

[1] Z_S and Z_L defined in Figure 1.

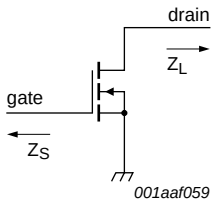
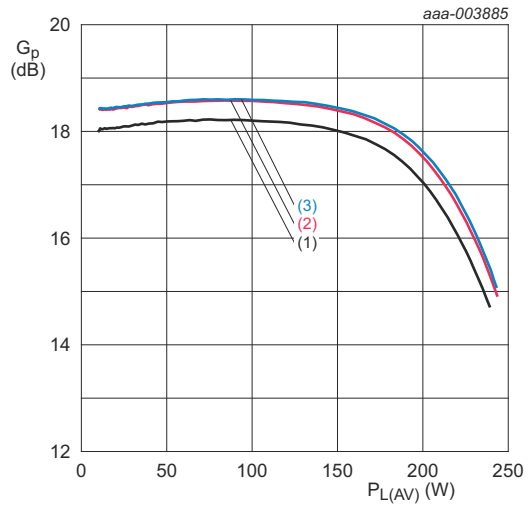


Fig 1. Definition of transistor impedance

8.3 1 Tone CW



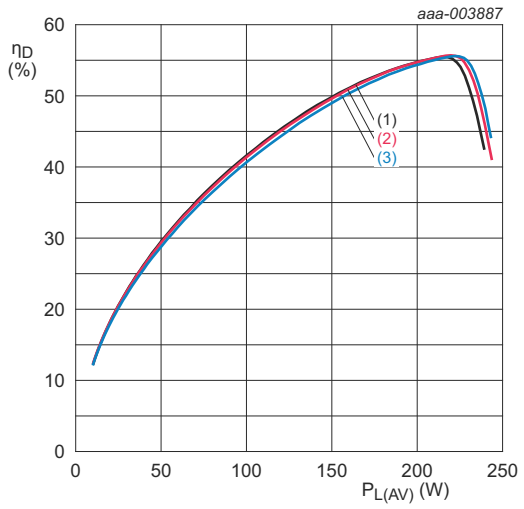
V_{DS} = 28 V; I_{Dq} = 1600 mA.

(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

Fig 2. Power gain as a function of average load power; typical values



V_{DS} = 28 V; I_{Dq} = 1600 mA.

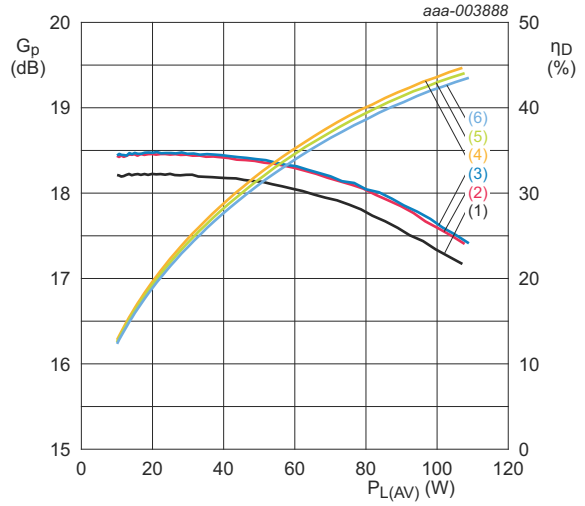
(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

Fig 3. Drain efficiency as a function of average load power; typical values

8.4 1-Carrier W-CDMA



V_{DS} = 28 V; I_{Dq} = 1600 mA; PAR = 7.2 dB at 0.01 % probability on the CCDF.

(1) G_p at f = 1805 MHz

(2) G_p at f = 1843 MHz

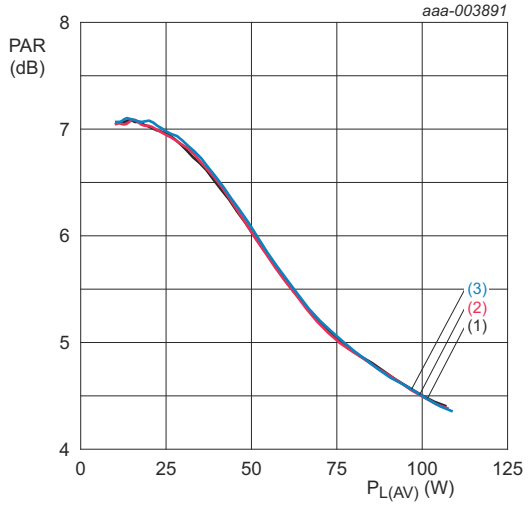
(3) G_p at f = 1880 MHz

(4) η_D at f = 1805 MHz

(5) η_D at f = 1843 MHz

(6) η_D at f = 1880 MHz

Fig 4. Power gain and drain efficiency as function of average load power; typical values



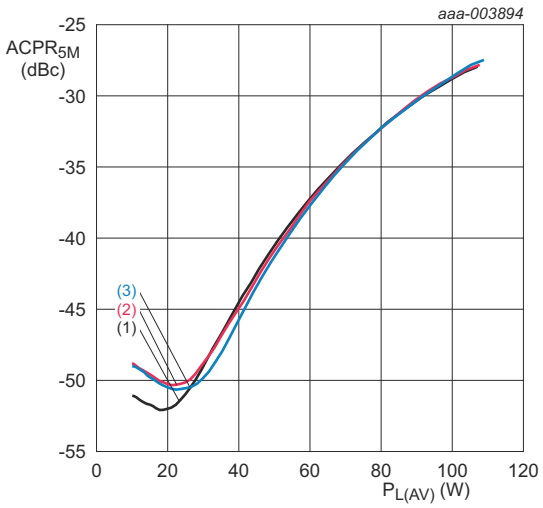
V_{DS} = 28 V; I_{Dq} = 1600 mA; PAR = 7.2 dB at 0.01 % probability on the CCDF.

(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

Fig 5. Peak-to-average power ratio as a function of average load power; typical values



V_{DS} = 28 V; I_{Dq} = 1600 mA; PAR = 7.2 dB at 0.01 % probability on the CCDF.

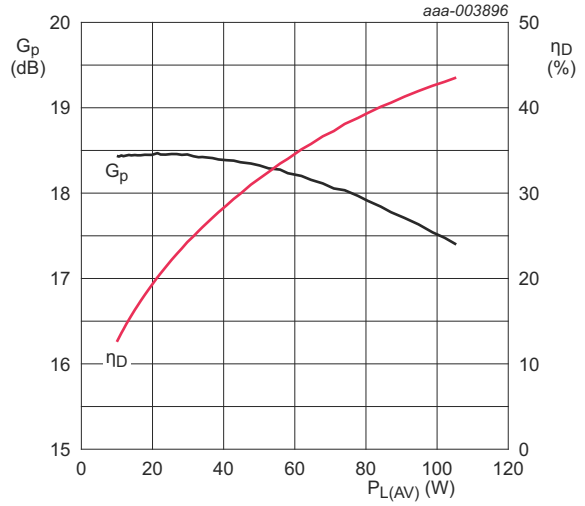
(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

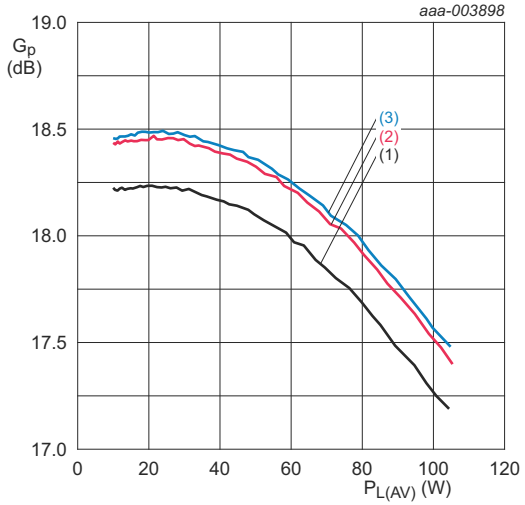
Fig 6. Adjacent power channel ratio (5 MHz) as a function of average load power; typical values

8.5 2-Carrier W-CDMA



V_{DS} = 28 V; I_{Dq} = 1600 mA; f = 1843 MHz; channel spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

Fig 7. Power gain and drain efficiency as function of average load power; typical values



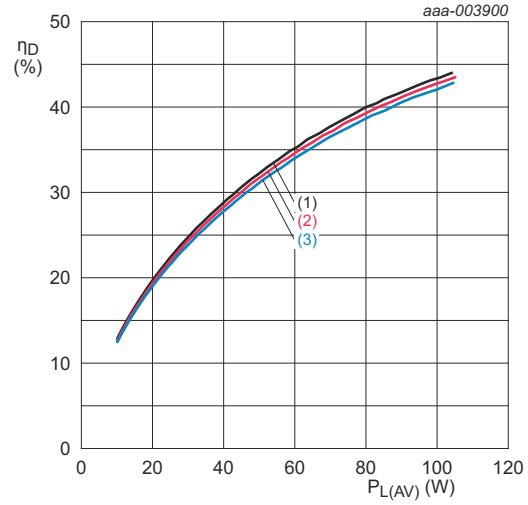
V_{DS} = 28 V; I_{Dq} = 1600 mA; channel spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

Fig 8. Power gain as a function of average load power; typical values



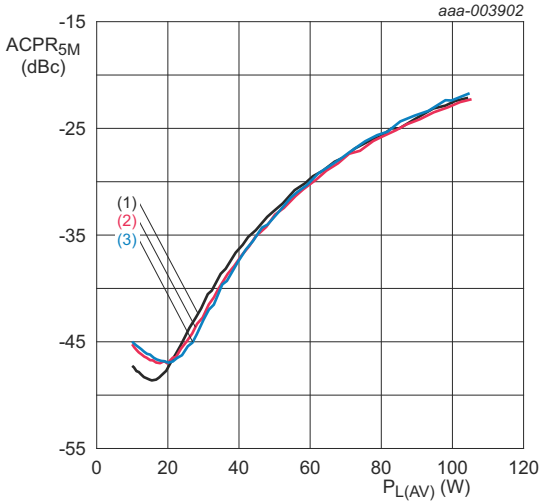
V_{DS} = 28 V; I_{Dq} = 1600 mA; channel spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

Fig 9. Drain efficiency as a function of average load power; typical values



V_{DS} = 28 V; I_{Dq} = 1600 mA; channel spacing = 5 MHz; PAR = 8.4 dB at 0.01 % probability on the CCDF.

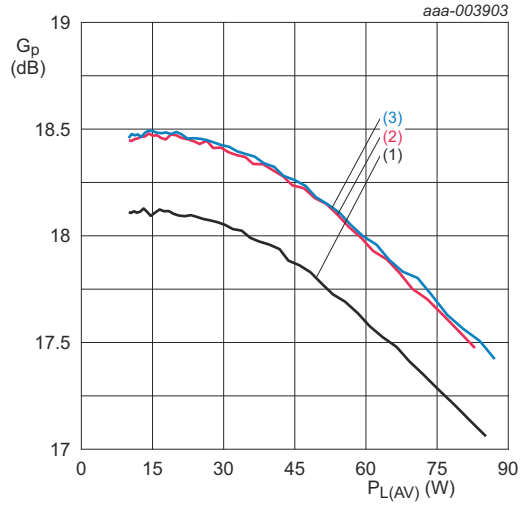
(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

Fig 10. Adjacent power channel ratio (5 MHz) as a function of average load power; typical values

8.6 IS-95



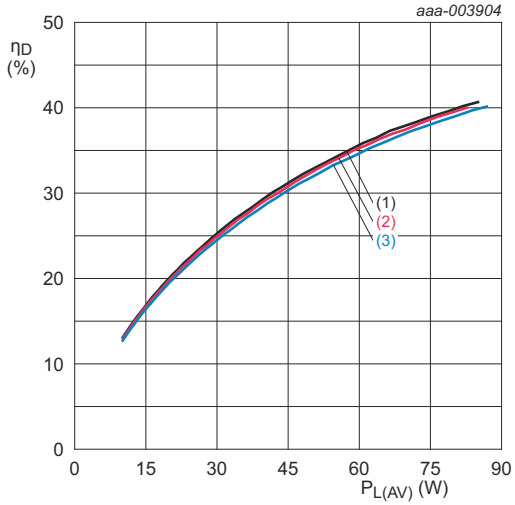
V_{DS} = 28 V; I_{Dq} = 1600 mA.

(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

Fig 11. Power gain as a function of average output power; typical values



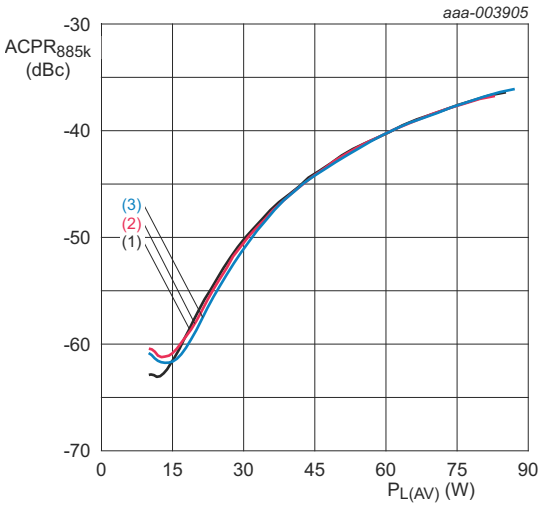
V_{DS} = 28 V; I_{Dq} = 1600 mA.

(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

Fig 12. Drain efficiency as a function of average load power; typical values



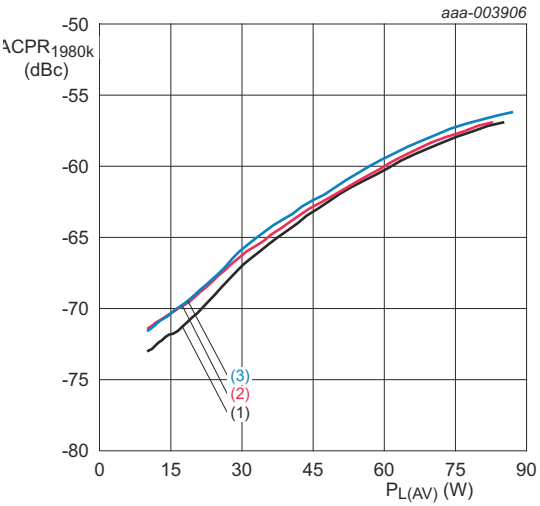
V_{DS} = 28 V; I_{Dq} = 1600 mA.

(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

Fig 13. Adjacent power channel ratio (885 kHz) as a function of average load power; typical values



V_{DS} = 28 V; I_{Dq} = 1600 mA.

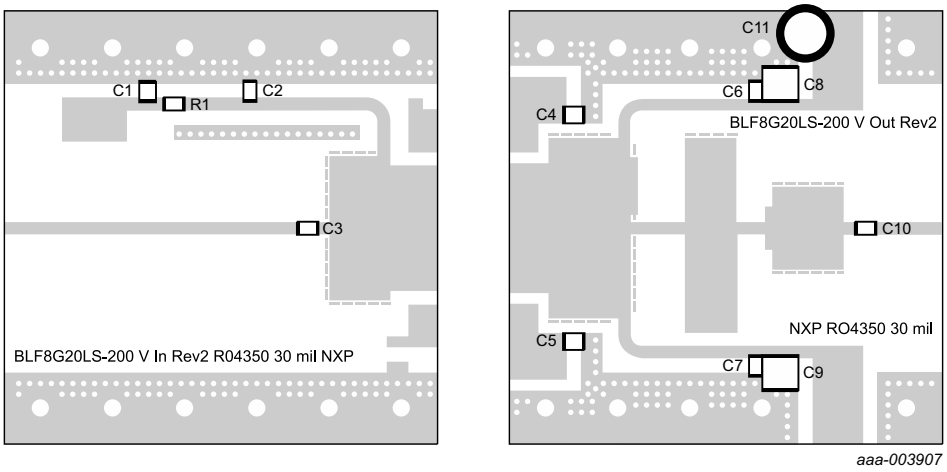
(1) f = 1805 MHz

(2) f = 1843 MHz

(3) f = 1880 MHz

Fig 14. Adjacent power channel ratio (1980 kHz) as a function of average load power; typical values

8.7 Test circuit



See Table 10 for list of components.

Fig 15. Component layout

Table 10. List of components

See Figure 15 for component layout.
The used PCB material is Rogers RO4350B with a thickness of 0.76 mm.

Component	Description	Value		Remarks
C1, C4, C5	multilayer ceramic chip capacitor	4.7 μF	[1]	TDK
C2, C3	multilayer ceramic chip capacitor	20 pF	[2]	ATC100B
C6, C7, C10	multilayer ceramic chip capacitor	20 pF	[3]	ATC800B
C8, C9	multilayer ceramic chip capacitor	10 μF	[1]	TDK
C11	electrolytic capacitor	470 μF; 63 V		
R1	chip resistor	9.1 Ω	[4]	Philips 0603

[1] TDK or capacitor of same quality.

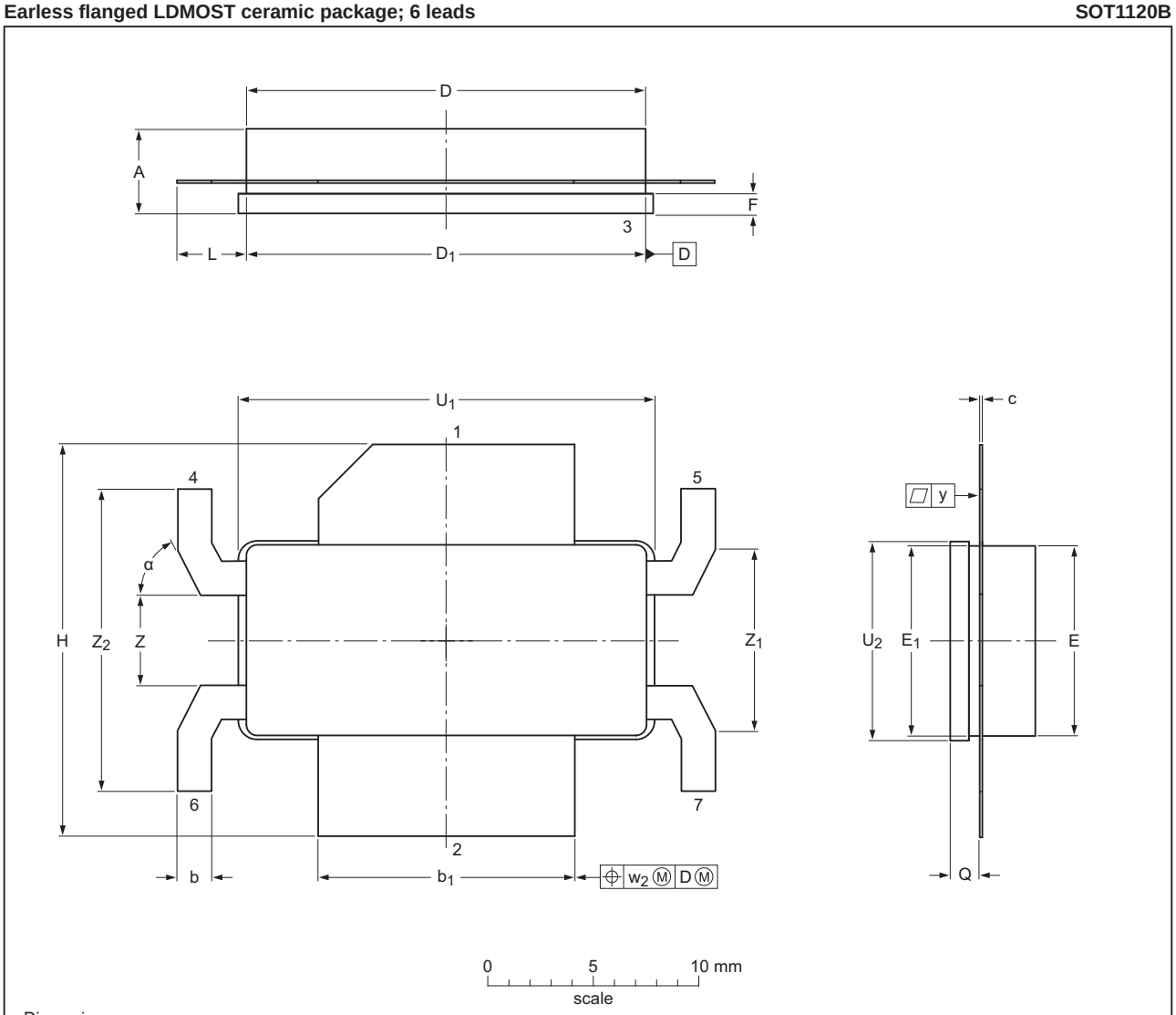
[2] American Technical Ceramics type 100B or capacitor of same quality.

[3] American Technical Ceramics type 800B or capacitor of same quality.

[4] Philips or resistor of same quality.

9. Package outline

Earless flanged LDMOST ceramic package; 6 leads **SOT1120B**



Dimensions

Unit[1]		A	b	b_1	c	D	D_1	E	E_1	F	H	L	Q[2]	U_1	U_2	w_2	y	Z	Z_1	Z_2	α
mm	max	4.75	1.83	12.83	0.18	20.02	19.96	9.53	9.53	1.14	19.94	3.56	1.70	20.70	9.91		0.15	4.60	9.53	15.52	64°
	nom															0.51					
	min	3.45	1.57	12.57	0.10	19.61	19.66	9.27	9.25	0.89	18.92	3.30	1.45	20.45	9.65			4.32	8.71	14.50	60°
inches	max	0.187	0.072	0.505	0.007	0.788	0.786	0.375	0.375	0.045	0.785	0.140	0.067	0.815	0.39		0.0059	0.181	0.375	0.611	64°
	nom															0.02					
	min	0.136	0.062	0.495	0.004	0.772	0.774	0.365	0.364	0.035	0.745	0.130	0.057	0.805	0.38			0.170	0.343	0.571	60°

Note
1. millimeter dimensions are derived from the original inch dimensions.
2. dimension is measured 0.030 inch (0.76 mm) from the body.

sot1120b_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1120B						~~12-04-11~~ 12-06-14

Fig 16. Package outline SOT1120B

10. Abbreviations

Table 11. Abbreviations

Acronym	Description
3GPP	Third Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal Oxide Semiconductor
LDMOST	Laterally Diffused Metal Oxide Semiconductor Transistor
MTTF	Mean Time To Failure
PAR	Peak-to-Average Ratio
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

11. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF8G20LS-200V v.1	20120704	Objective data sheet	-	-

12. Legal information

12.1 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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14. Contents

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