BLF6G10L-40BRN

Power LDMOS transistor

Rev. 3 — 16 November 2010 Product data sheet

1. Product profile

1.1 General description

40 W LDMOS power transistor for base station applications at frequencies from 700 MHz to 1 GHz.

Table 1. Typical performance

Typical RF performance at T_{case} = 25 °C in a class-AB production test circuit.

Mode of operation	f	V_{DS}	$P_{L(AV)}$	G_p	η_D	ACPR
	(MHz)	(V)	(W)	(dB)	(%)	(dBc)
2-carrier W-CDMA[1]	791 to 821	28	2.5	23.0	15.0	−42.5

[1] Test signal: 3GPP test model 1; 64 DPCH; PAR = 7.5 dB at 0.01 % probability on CCDF per carrier; carrier spacing 5 MHz.

1.2 Features and benefits

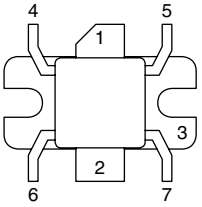
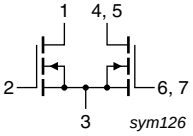
- Typical 2-carrier W-CDMA performance at frequencies of 791 MHz and 821 MHz, a supply voltage of 28 V and an I_{Dq} of 390 mA:
  - Average output power = 2.5 W
  - Power gain = 23.0 dB
  - Efficiency = 15.0 %
  - ACPR = −42.5 dBc
- Easy power control
- Integrated ESD protection
- Enhanced ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (728 MHz to 960 MHz)
- Internally matched for ease of use
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)
- Integrated current sense

1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier GSM and LTE applications in the 728 MHz to 960 MHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source [1]		
4, 5	sense drain		
6, 7	sense gate		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF6G10L-40BRN	-	flanged ceramic package; 2 mounting holes; 6 leads	SOT1112A

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	+11	V
$V_{GS(sense)}$	sense gate-source voltage		–0.5	+9	V
I_D	drain current		-	11	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
$R_{th(j-case)}$	thermal resistance from junction to case	T_{case} = 80 °C; P_L = 2.5 W(CW)	1.7	K/W

6. Characteristics

Table 6. 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 = 0.5 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 59 mA	1.4	1.9	2.4	V
I_{Dq}	quiescent drain current	sense transistor: I_{DS} = 8.2 mA; V_{DS} = 26.5 V main transistor: V_{DS} = 28 V	340	390	440	mA
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	1.4	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	8.8	10	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	140	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 2.9 A	2.7	4.3	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 2.063 A	0.09	0.25	0.39	Ω

7. Application information

Table 7. Application information

Mode of operation: 2-carrier W-CDMA; PAR = 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH; f_1 = 788.5 MHz; f_2 = 793.5 MHz; f_3 = 818.5 MHz; f_4 = 823.5 MHz; RF performance at V_{DS} = 28 V; $I_{Dq(nom)}$ = 390 mA; T_{case} = 25 °C; unless otherwise specified in a class AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	2.5	-	W
G_p	power gain	$P_{L(AV)}$ = 2.5 W	22	23.0	-	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 2.5 W	-	−15	−10	dB
η_D	drain efficiency	$P_{L(AV)}$ = 2.5 W	13	15	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 2.5 W	-	−42.5	−38	dBc

Table 8. Application information

Mode of operation; 1-carrier W-CDMA; PAR = 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 64 DPCH; f = 821 MHz; RF performance at V_{DS} = 28 V; $I_{Dq(nom)}$ = 390 mA; T_{case} = 25 °C; unless otherwise specified in a class AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
PAR	peak-to-average ratio	$P_{L(AV)}$ = 10 W at 0.01 % probability on CCDF	5.5	5.9	-	dB

7.1 Ruggedness in class-AB operation

The BLF6G10L-40BRN 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} = 390 mA; P_L = 32 W; f = 791 MHz and 821 MHz.

7.2 Impedance information

Table 9. Typical impedance per section

I_{Dq} = 390 mA; main transistor V_{DS} = 28 V

f	Z_S[1]	Z_L[1]
(MHz)	(Ω)	(Ω)
800	2.0 – j5.0	5.3 + j2.9
810	2.0 – j5.5	5.6 + j2.3

[1] Z_S and Z_L defined in Figure 1.

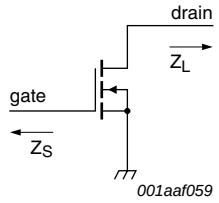
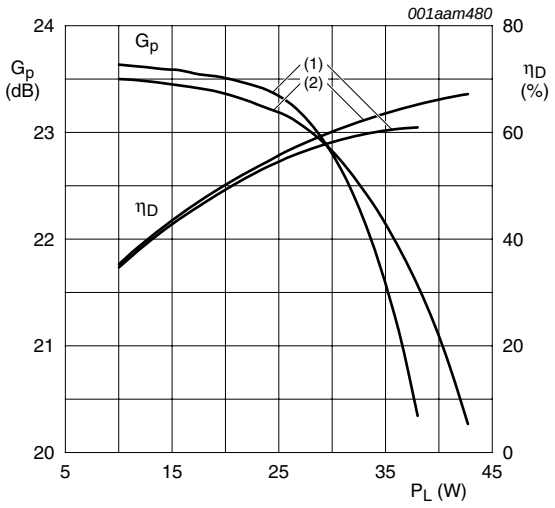


Fig 1. Definition of transistor impedance

7.3 Graphs

7.3.1 1 Tone CW

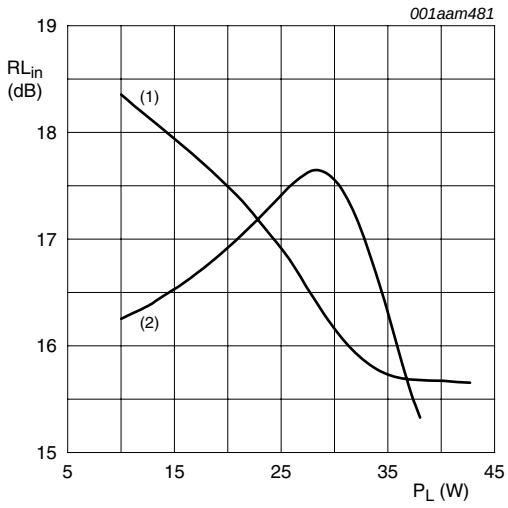


V_{DS} = 28 V; I_{Dq} = 390 mA.

(1) f = 791 MHz

(2) f = 821 MHz

Fig 2. One-tone CW power gain and drain efficiency as function of output power; typical values



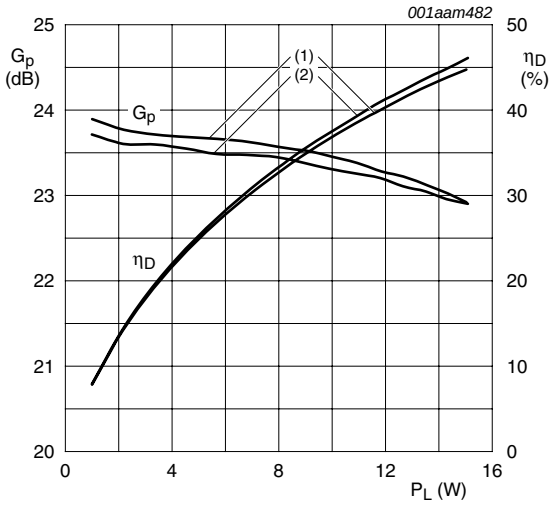
V_{DS} = 28 V; I_{Dq} = 390 mA.

(1) f = 791 MHz

(2) f = 821 MHz

Fig 3. One-tone CW input return loss as function of output power; typical values

7.3.2 2-carrier W-CDMA (5 MHz spacing)

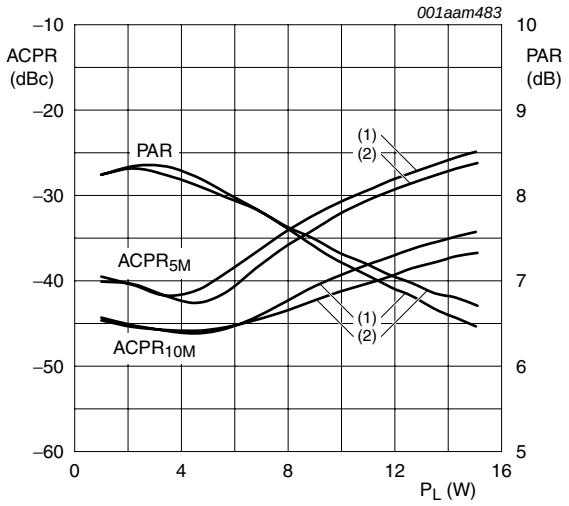


3GPP; Test Model 1; 64 DPCH, PAR = 7.5 dB at 0.01 % probability per carrier; carrier spacing 5 MHz; V_{DS} = 28 V; I_{Dq} = 390 mA.

(1) f = 791 MHz

(2) f = 821 MHz

Fig 4. 2-carrier W-CDMA power gain and drain efficiency as function of output power; typical values



3GPP; Test Model 1; 64 DPCH, PAR = 7.5 dB at 0.01 % probability per carrier; carrier spacing 5 MHz; V_{DS} = 28 V; I_{Dq} = 390 mA.

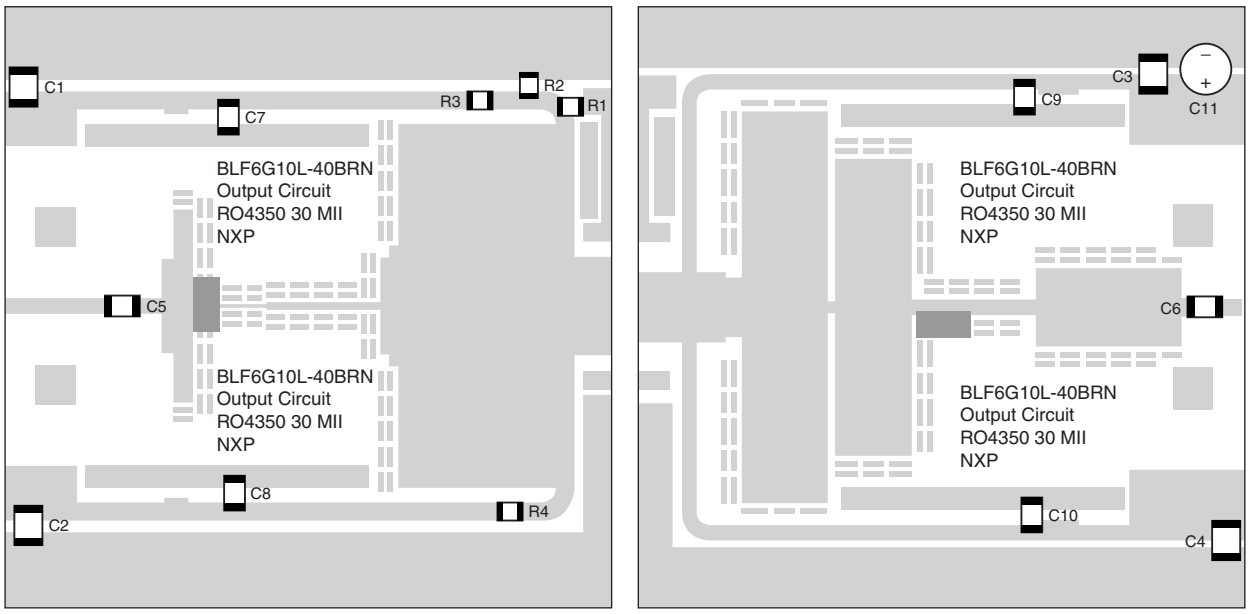
(1) f = 791 MHz

(2) f = 821 MHz

Fig 5. 2-carrier W-CDMA adjacent channel power ratio and peak aspect ratio as function of output power; typical values

8. Test information

8.1 Test circuit



The vias can be as a reference to place components.

The above layout shows the test circuit used to measure the devices in production.

See Table 10 for list of components.

Fig 6. Component layout

Table 10. List of components

See Figure 6 for component layout.

Component	Description	Value		Remarks
C1, C2, C3, C4	multilayer ceramic chip capacitor	10 μF	[1]	
C5,C6	multilayer ceramic chip capacitor	47 pF	[2]	
C7, C8	multilayer ceramic chip capacitor	100 pF	[2]	
C9, C10	multilayer ceramic chip capacitor	30 pF	[2]	
C11	electrolytic capacitor	470 μF; 63 V		
R1	chip resistor	820 Ω	[3]	1206
R2	chip resistor	2.2 kΩ	[3]	1206
R3, R4	chip resistor	15 Ω	[3]	1206

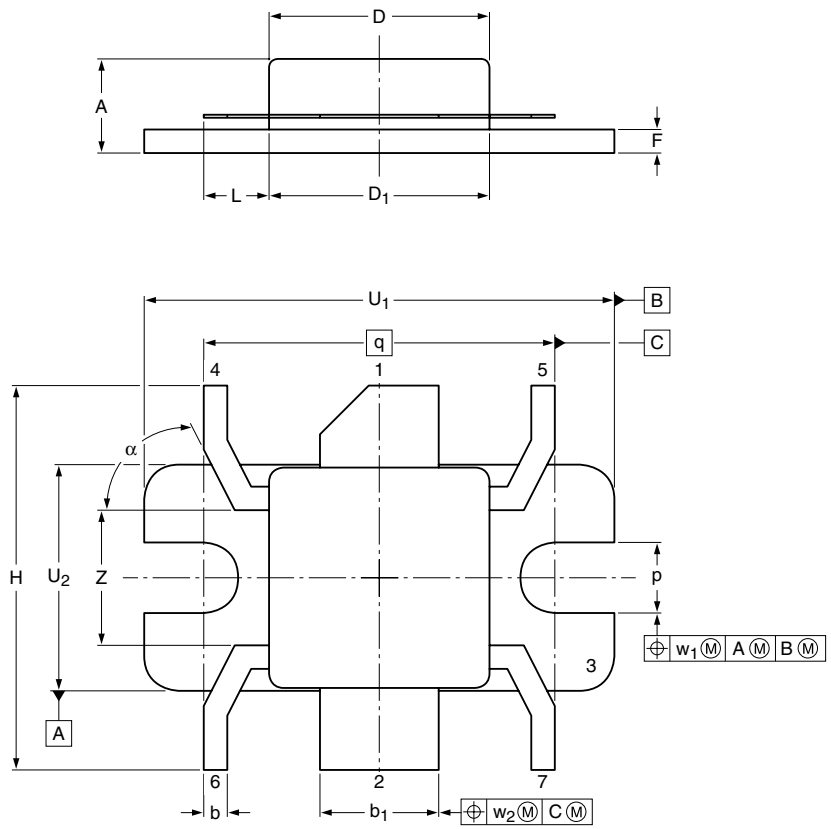
[1] Murata or capacitor of same quality.

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

[3] Philips or resistor of same quality.

9. Package outline

Flanged ceramic package; 2 mounting holes; 6 leads **SOT1112A**



Dimensions

Unit[1]		A	b	b_1	c	D	D_1	E	E_1	F	H	L	p	Q[2]	q	U_1	U_2	w_1	w_2	Z	α
mm	max	4.65	1.14	5.26	0.18	9.65	9.65	9.65	9.65	1.14	17.12	3.00	3.30	1.70		20.45	9.91			5.97	64°
	nom														15.24			0.25	0.51		
	min	3.76	0.89	5.00	0.10	9.40	9.40	9.40	9.40	0.89	16.10	2.69	2.92	1.45		20.19	9.65			5.72	62°
inches	max	0.183	0.045	0.207	0.007	0.38	0.38	0.38	0.38	0.045	0.674	0.118	0.130	0.067		0.805	0.39			0.235	64°
	nom														0.6			0.01	0.02		
	min	0.148	0.035	0.197	0.004	0.37	0.37	0.37	0.37	0.035	0.634	0.106	0.115	0.057		0.795	0.38			0.225	62°

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

sot1112a_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1112A						~~09-10-12~~ 10-02-02

Fig 7. Package outline SOT1112A

10. Abbreviations

Table 11. Abbreviations

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
DPCH	Dedicated Physical CHannel
ESD	ElectroStatic Discharge
GSM	Global System for Mobile communications
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
LTE	Long Term Evolution
PAR	Peak-to-Average power Ratio
RF	Radio Frequency
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
BLF6G10L-40BRN v.3	20101116	Product data sheet	-	BLF6G10L-40BRN v.2
Modifications:	• In the entire data sheet the typical value of I_{Dq} has been changed to 390 mA. • Table 6 on page 3: the values of I_{Dq} have been changed. • Table 7 on page 3: Some values have been changed. • Section 7.1 on page 3: The value of VSWR has been corrected.			
BLF6G10L-40BRN v.2	20100827	Preliminary data sheet	-	BLF6G10L-40BRN v.1
BLF6G10L-40BRN v.1	20100809	Preliminary 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".

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14. Contents

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