BLF6G15L-40RN; BLF6G15LS-40RN

Power LDMOS transistor

Rev. 2 — 14 May 2012 Product data sheet

1. Product profile

1.1 General description

40 W LDMOS power transistor for base station applications at frequencies from 1450 MHz to 1550 MHz.

Table 1. Typical performance

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

Test signal	f	V_{DS}	$P_{L(AV)}$	G_p	η_D	ACPR
	(MHz)	(V)	(W)	(dB)	(%)	(dBc)
2-carrier W-CDMA	1476 to 1511	28	2.5	22.5	13.5	−45[1]

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

1.2 Features and benefits

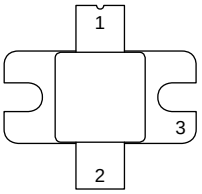
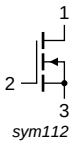
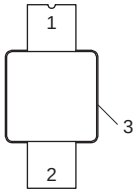
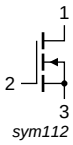
- Typical 2-carrier W-CDMA performance at frequencies of 1476 MHz and 1511 MHz, a supply voltage of 28 V and an I_{Dq} of 375 mA:
  - Average output power = 2.5 W
  - Power gain = 22.5 dB
  - Efficiency = 13.5 %
  - ACPR = −45 dBc
- Easy power control
- Integrated ESD protection
- Enhanced ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation (1450 MHz to 1550 MHz)
- Internally matched for ease of use
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

1.3 Applications

- RF power amplifiers for W-CDMA base stations and multi carrier applications in the 1450 MHz to 1550 MHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description		Simplified outline	Graphic symbol
BLF6G15L-40RN (SOT1135A)				
1	drain			
2	gate			
3	source	[1]		
BLF6G15LS-40RN (SOT1135B)				
1	drain			
2	gate			
3	source	[1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF6G15L-40RN	-	flanged ceramic package; 2 mounting holes; 2 leads	SOT1135A
BLF6G15LS-40RN	-	earless flanged ceramic package; 2 leads	SOT1135B

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
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
$R_{th(j\text{-}case)}$	thermal resistance from junction to case	T_{case} = 80 °C; P_L = 2.5 W (CW)	1.30	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 = 0.59 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 59 mA	1.4	1.8	2.4	V
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	-	9.4	-	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 = 58.9 mA	-	0.5	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 2.06 A	-	0.32	-	Ω

7. Application information

Table 7. 2-carrier W-CDMA RF performance

Class-AB production test circuit; PAR 8.4 dB at 0.01 % probability on CCDF; carrier spacing 5 MHz; 3GPP test model 1; 64 DPCH; f_1 = 1476 MHz; f_2 = 1511 MHz; RF performance at V_{DS} = 28 V; I_{Dq} = 375 mA; T_{case} = 25 °C; unless otherwise specified.

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	19.8	22.5	-	dB
RL_{in}	input return loss	$P_{L(AV)}$ = 2.5 W	-	–16	–11	dB
η_D	drain efficiency	$P_{L(AV)}$ = 2.5 W	11.5	13.5	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 2.5 W	-	–45	–40	dBc

7.1 Ruggedness in Class-AB operations

The BLF6G15L-40RN and the BLF6G15LS-40RN are capable of withstanding a load mismatch corresponding to VSWR 10 : 1 through all phases under following conditions: V_{DS} = 28 V; I_{Dq} = 375 mA; P_L = 40 W; f = 1476 MHz (CW).

8. Test information

8.1 Impedance information

Table 8. Typical impedance

Measured load-pull data. Typical values per section. I_{Dq} = 330 mA; main transistor V_{DS} = 28 V Z_S and Z_L defined in Figure 1.

f (MHz)	Z_S (Ω)	Z_L (Ω)
1450	4.4 – j5.9	5.5 – j4.6
1480	4.4 – j4.1	5.0 – j5.0
1510	6.4 – j4.7	5.0 – j5.0

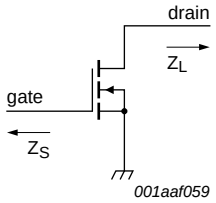
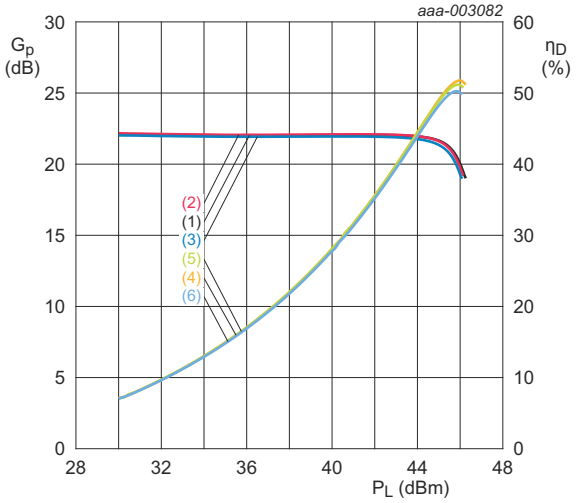


Fig 1. Definition of transistor impedance

8.2 One-tone graphs



V_{DS} = 28 V; I_{Dq} = 375 mA.

(1) G_p at f = 1475 MHz

(2) G_p at f = 1493 MHz

(3) G_p at f = 1511 MHz

(4) η_D at f = 1475 MHz

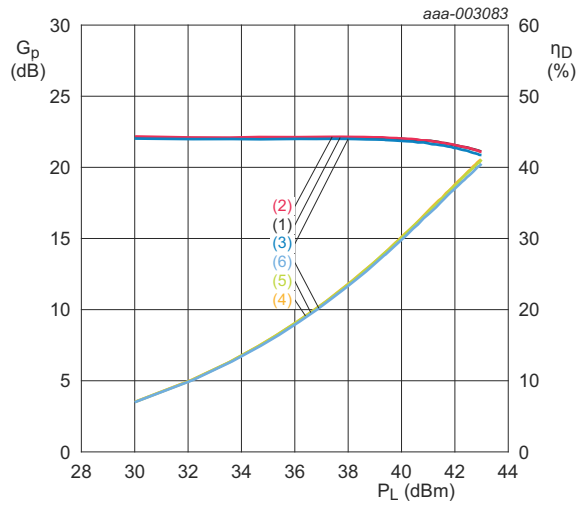
(5) η_D at f = 1493 MHz

(6) η_D at f = 1511 MHz

Fig 2. Power gain and drain efficiency as function of load power; typical values

8.3 2-Carrier W-CDMA graphs

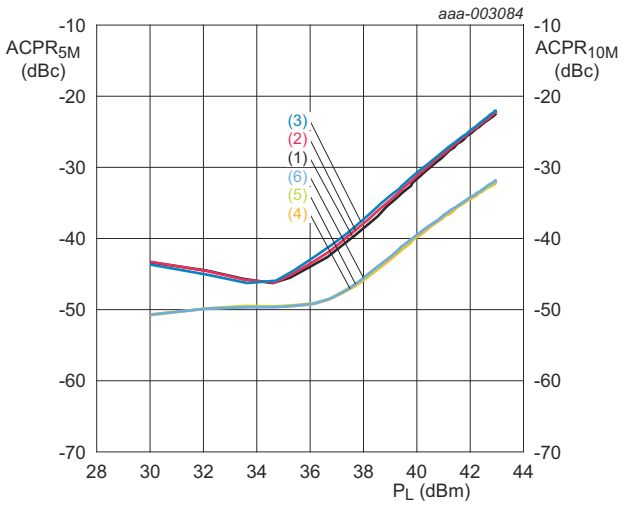
3GPP, test model 1; 64 DPCH, PAR = 8.4 dB at 0.01 % probability, 5 MHz carrier spacing.



T_{amb} = 25 °C.

(1) G_p at f = 1475 MHz
(2) G_p at f = 1493 MHz
(3) G_p at f = 1511 MHz
(4) η_D at f = 1475 MHz
(5) η_D at f = 1493 MHz
(6) η_D at f = 1511 MHz

Fig 3. Power gain and drain efficiency as function of load power; typical values

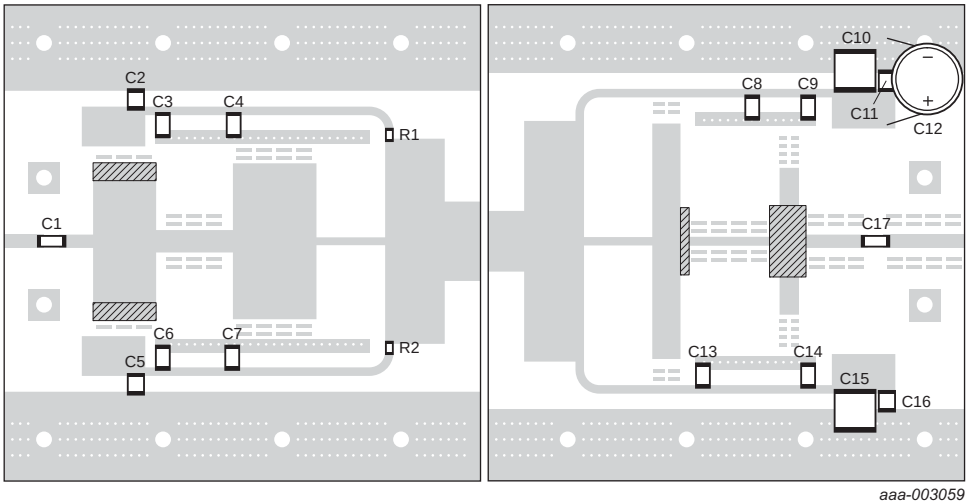


T_{amb} = 25 °C.

(1) $ACPR_{5M}$ at f = 1475 MHz
(2) $ACPR_{5M}$ at f = 1493 MHz
(3) $ACPR_{5M}$ at f = 1511 MHz
(4) $ACPR_{10M}$ at f = 1475 MHz
(5) $ACPR_{10M}$ at f = 1493 MHz
(6) $ACPR_{10M}$ at f = 1511 MHz

Fig 4. Adjacent channel power ratio (5 MHz and 10 MHz) as a function of load power; typical values

8.4 Test circuit



Striplines are on a double copper-clad Rogers R04350 Printed-Circuit Board (PCB) with ε_r = 3.5, thickness = 0.762 mm and thickness copper plating = 35 μm.

See Table 9 for list of components.

Fig 5. Component layout for test circuit

Table 9. List of components

For test circuit, see Figure 5.

Component	Description	Value	Remarks
C1, C17	multilayer ceramic chip capacitor	24 pF	[1]
C3, C6	multilayer ceramic chip capacitor	68 pF	[2]
C4, C7, C8	multilayer ceramic chip capacitor	150 pF	[2]
C9, C14	multilayer ceramic chip capacitor	47 pF	[2]
C13	multilayer ceramic chip capacitor	15 pF	[2]
C2, C5, C11, C16	multilayer ceramic chip capacitor	10 μF	[3]
C10, C15	multilayer ceramic chip capacitor	0.1 μF	[3]
C12	electrolytic capacitor	2200 μF, 50 V	
R1, R2	chip resistor	15 Ω	

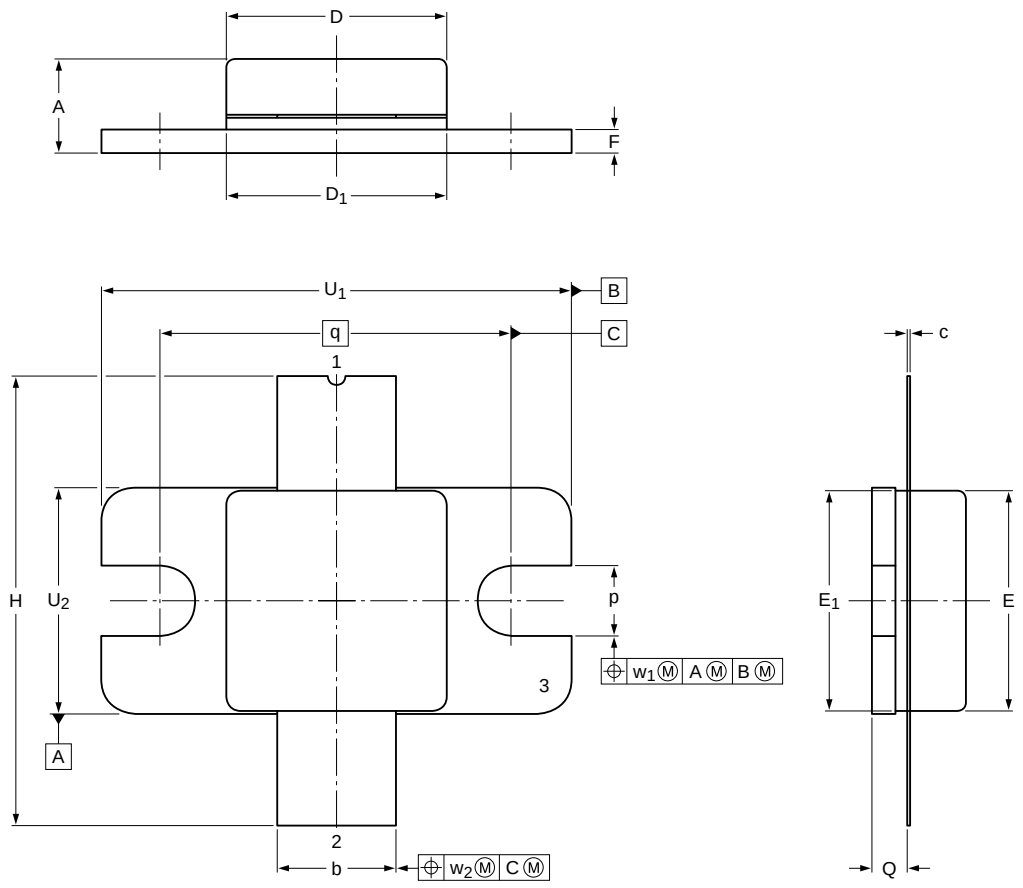
[1] American technical ceramics type 800B or capacitor of same quality.

[2] American technical ceramics type 100B or capacitor of same quality.

[3] TDK or capacitor of same quality.

9. Package outline

Flanged ceramic package; 2 mounting holes; 2 leads **SOT1135A**



Dimensions

Unit[1]		A	b	c	D	D_1	E	E_1	F	H	p	Q	q	U_1	U_2	w_1	w_2
mm	max	4.65	5.26	0.18	9.65	9.65	9.65	9.65	1.14	19.94	3.30	1.70		20.45	9.91		
	nom												15.24			0.25	0.51
	min	3.76	5.00	0.10	9.40	9.40	9.40	9.40	0.89	18.92	2.92	1.45		20.19	9.65		
inches	max	0.183	0.207	0.007	0.38	0.38	0.38	0.38	0.045	0.785	0.130	0.067		0.805	0.39		
	nom												0.6			0.01	0.02
	min	0.148	0.197	0.004	0.37	0.37	0.37	0.37	0.035	0.745	0.115	0.057		0.795	0.38		

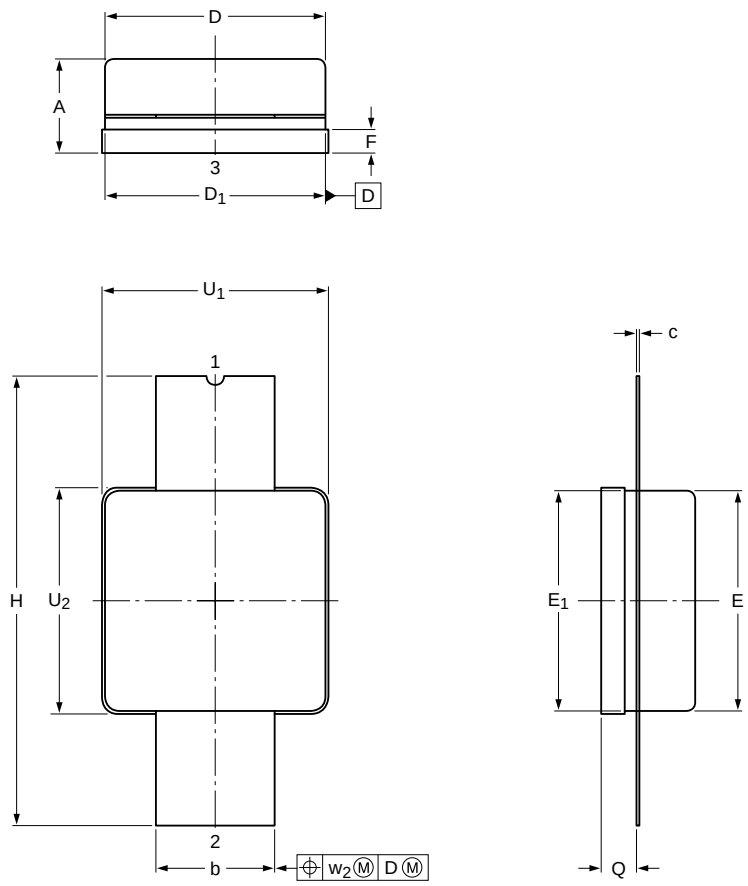
Note
1. millimeter dimensions are derived from the original inch dimensions.
2. dimension is measured 0.030 inch (0.76 mm) from the body.

sot1135a_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1135A						~~09-10-12~~ 09-12-14

Fig 6. Package outline SOT1135A

Earless flanged ceramic package; 2 leads **SOT1135B**



Dimensions

Unit[1]		A	b	c	D	D_1	E	E_1	F	H	Q	U_1	U_2	w_2
mm	max	4.65	5.26	0.18	9.65	9.65	9.65	9.65	1.14	19.94	1.70	9.91	9.91	0.51
	nom													
	min	3.76	5.00	0.10	9.40	9.40	9.40	9.40	0.89	18.92	1.45	9.65	9.65	
inches	max	0.183	0.207	0.007	0.38	0.38	0.38	0.38	0.045	0.785	0.067	0.39	0.39	0.02
	nom													
	min	0.148	0.197	0.004	0.37	0.37	0.37	0.37	0.035	0.745	0.057	0.38	0.38	

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

sot1135b_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1135B						~~09-10-12~~ 09-12-14

Fig 7. Package outline SOT1135B

10. Handling information

CAUTION

This device is sensitive to ElectroStatic Discharge (ESD). Observe precautions for handling electrostatic sensitive devices.

Such precautions are described in the *ANSI/ESD S20.20*, *IEC/ST 61340-5*, *JESD625-A* or equivalent standards.

11. Abbreviations

Table 10. Abbreviations

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical Channel
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
PAR	Peak-to-Average Ratio
RF	Radio Frequency
VSWR	Voltage Standing-Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

12. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G15L-40RN_6G15LS-40RN v.2	20120514	Product data sheet	-	BLF6G15L-40RN_6G15LS-40RN v.1
Modifications:	• Section 1.1 on page 1: updated • Section 1.2 on page 1: updated • Table 4 on page 2: I_D removed • Table 5 on page 2: updated • Table 6 on page 3: updated • Table 7 on page 3: updated • Section 7.1 on page 3: added • Section 8 on page 3: added			
BLF6G15L-40RN_6G15LS-40RN v.1	20111027	Objective data sheet	-	-

13. Legal information

13.1 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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15. Contents

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