BLF640

Broadband power LDMOS transistor

Rev. 3 — 1 September 2015

AMPLEON

Product data sheet

1. Product profile

1.1 General description

10 W LDMOS power transistor for applications at frequencies from HF to 2200 MHz

Table 1. Typical performance

I_{Dq} = 100 mA; T_{case} = 25 °C in a common source class-AB production test circuit.

Test signal	f (MHz)	V_{DS} (V)	$P_{L(AV)}$ (W)	G_p (dB)	η_D (%)	ACPR (dBc)
2-carrier W-CDMA	2110 to 2170	28	0.7	18.5	15	–50 [1]
1-carrier W-CDMA	2110 to 2170	28	2	19.3	31	–39 [1]

[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

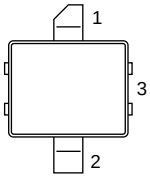
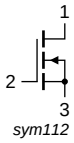
- Easy power control
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- No internal matching for broadband operation
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- RF power amplifiers for applications in the HF to 2200 MHz frequency range
- Broadcast drivers

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain		
2	gate		
3	source [1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF640	-	ceramic surface-mounted package; 2 leads	SOT538A

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		-	225	°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; $P_{L(AV)}$ = 11 W	[1]	3.2	K/W

[1] Thermal resistance is determined under specified RF operating conditions

6. Characteristics

Table 6. DC 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 = 0.5 mA	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 10 V; I_D = 18 mA	1.4	1.9	2.4	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	1.5	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	-	3.1	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	150	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 0.9 A	-	0.5	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 0.625 A	-	0.4	-	Ω

Table 7. AC characteristics
T_j = 25 °C unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
C_{rs}	feedback capacitance	V_{GS} = 0 V; V_{DS} = 28 V; f = 1 MHz	-	0.5	-	pF

Table 8. RF characteristics
PAR 7.5 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1-64 PDPCH; RF performance at V_{DS} = 28 V; I_{Dq} = 100 mA; T_{case} = 25 °C; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Test signal: 2-carrier W-CDMA		**f_1 = 2112.5 MHz; f_2 = 2117.5 MHz; f_3 = 2162.5 MHz; f_4 = 2167.5 MHz**				
G_p	power gain	$P_{L(AV)}$ = 0.7 W	-	18.5	-	dB
η_D	drain efficiency	$P_{L(AV)}$ = 0.7 W	-	15	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 0.7 W	-	–50	-	dBc
Test signal: 1-carrier W-CDMA		**f_1 = 2112.5 MHz; f_2 = 2167.5 MHz**				
G_p	power gain	$P_{L(AV)}$ = 2 W	17.3	19.3	-	dB
η_D	drain efficiency	$P_{L(AV)}$ = 2 W	29	31	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 2 W	-	–39	–36	dBc

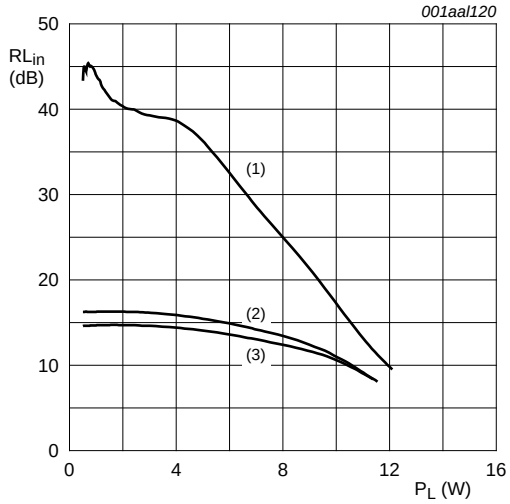
7. Test information

7.1 Ruggedness in class-AB operation

The BLF640 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 28 V; f = 2140 MHz at P_L = 10 W.

7.2 Graphical data

7.2.1 CW



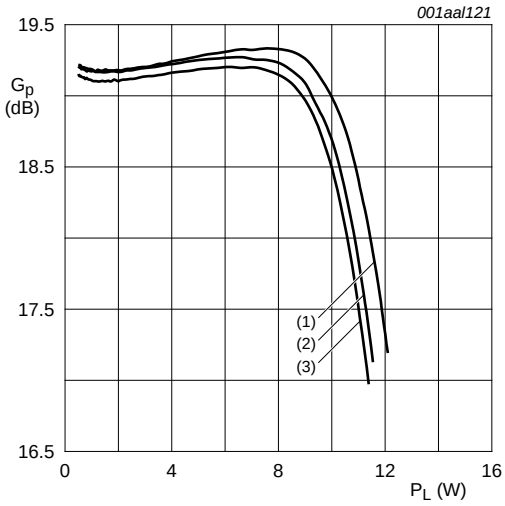
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 1. Input return loss as a function of load power; typical values



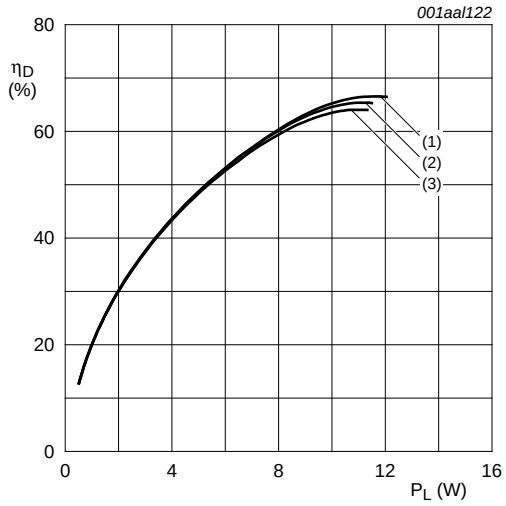
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

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



V_{DS} = 28 V; I_{Dq} = 100 mA.

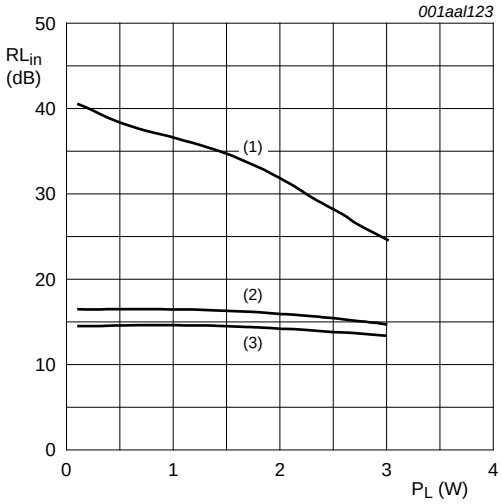
(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

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

7.2.2 1-Carrier W-CDMA



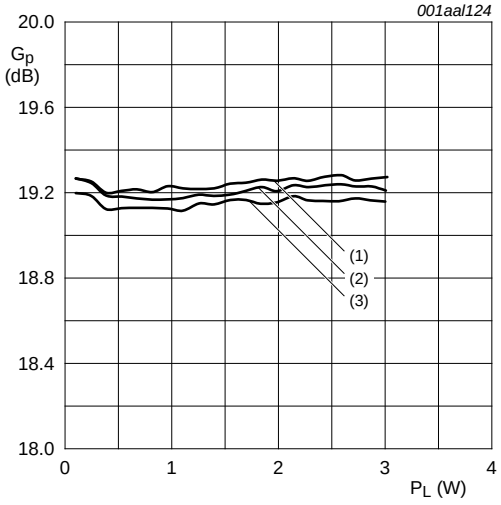
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 4. Input return loss as a function of load power; typical values



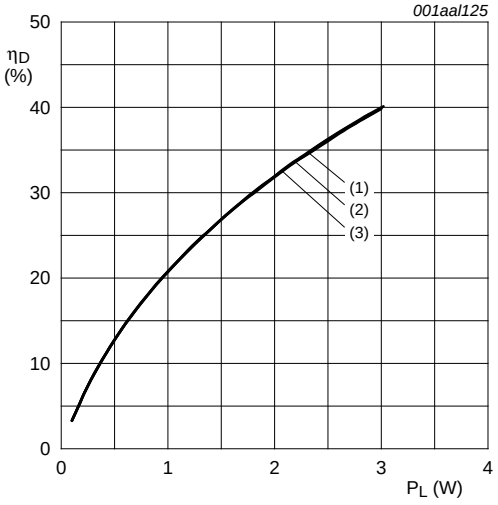
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 5. Power gain as a function of load power; typical values



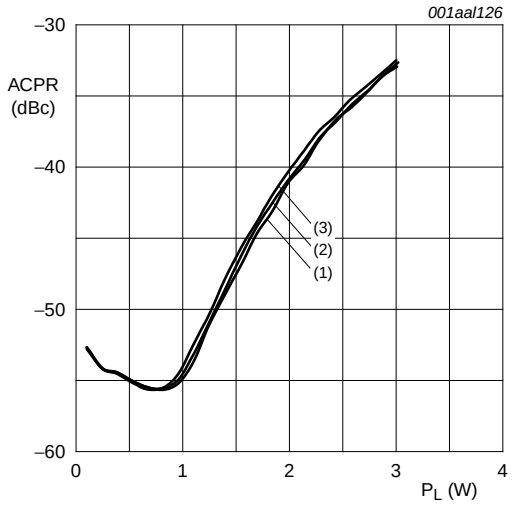
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 6. Drain efficiency as a function of load power; typical values



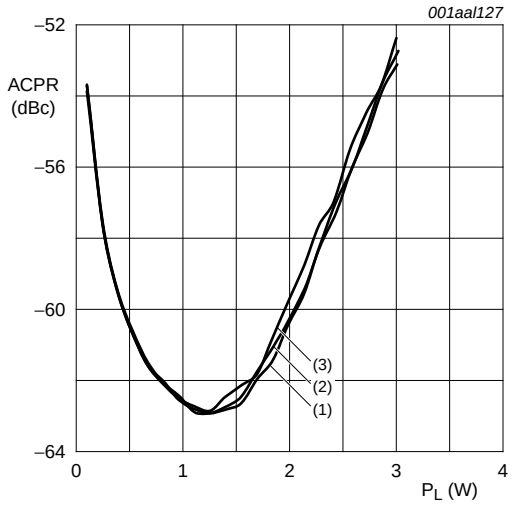
V_{DS} = 28 V; I_{Dq} = 100 mA; carrier spacing 5 MHz.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 7. Adjacent channel power ratio as a function of load power; typical values



V_{DS} = 28 V; I_{Dq} = 100 mA; carrier spacing 10 MHz.

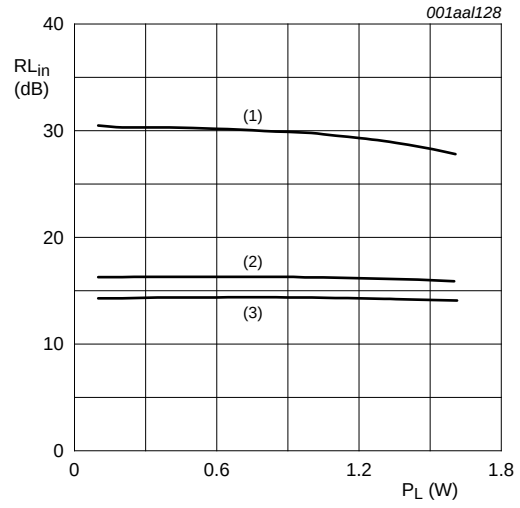
(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 8. Adjacent channel power ratio as a function of load power; typical values

7.2.3 2-Carrier W-CDMA



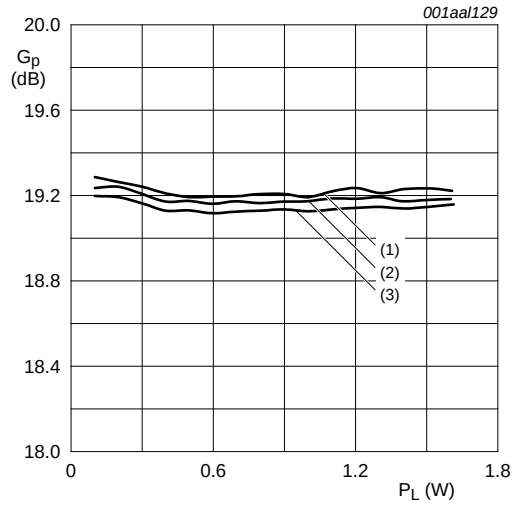
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 9. Input return loss as a function of load power; typical values



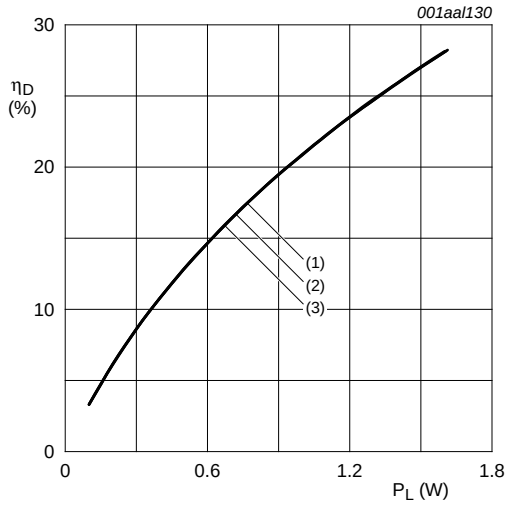
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 10. Power gain as a function of load power; typical values



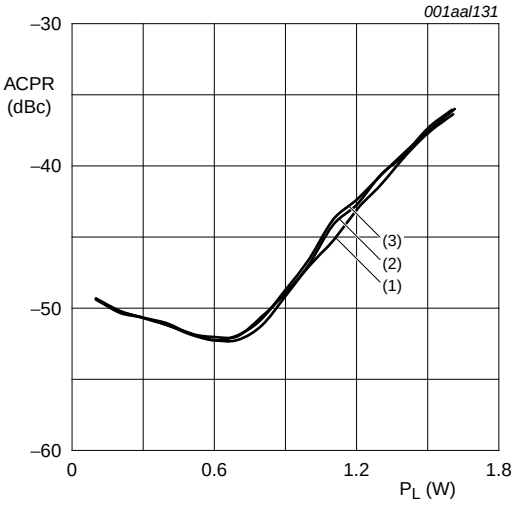
V_{DS} = 28 V; I_{Dq} = 100 mA.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 11. Drain efficiency as a function of load power; typical values



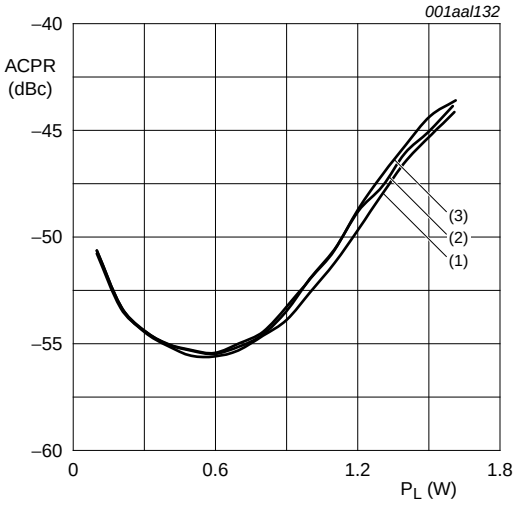
V_{DS} = 28 V; I_{Dq} = 100 mA; carrier spacing 5 MHz.

(1) f = 2.11 GHz

(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 12. Adjacent channel power ratio as a function of load power; typical values



V_{DS} = 28 V; I_{Dq} = 100 mA; carrier spacing 10 MHz.

(1) f = 2.11 GHz

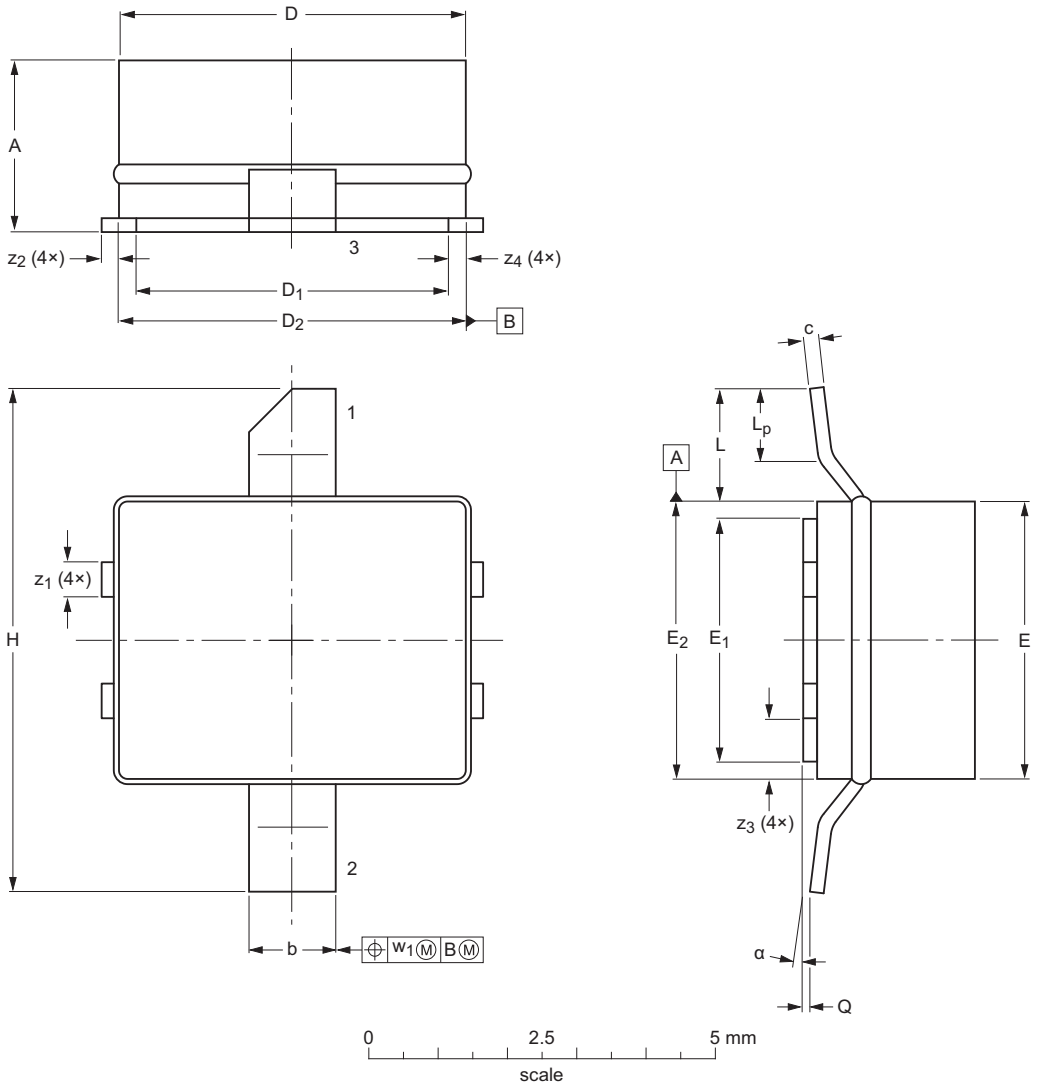
(2) f = 2.14 GHz

(3) f = 2.17 GHz

Fig 13. Adjacent channel power ratio as a function of load power; typical values

8. Package outline

Ceramic surface-mounted package; 2 leads **SOT538A**



Dimensions (mm are the original dimensions)

Unit		A	b	c	D	D_1	D_2	E	E_1	E_2	H	L	L_p	Q	w_1	z_1	z_2	z_3	z_4	θ
mm	max	2.34	1.35	0.23	5.16	4.65	5.16	4.14	3.63	4.14	7.49	2.03	1.02	0.1		0.58	0.25	0.97	0.51	7°
	nom														0.25					
	min	2.13	1.19	0.18	5.00	4.50	5.00	3.99	3.48	3.99	7.24	1.27	0.51	0.0		0.43	0.18	0.81	0.00	0°

sot538a_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT538A						~~13-02-07~~ 15-04-05

Fig 14. Package outline SOT538A

9. 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.

10. Abbreviations

Table 9. Abbreviations

Acronym	Description
3GPP	3rd Generation Partnership Project
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
DPCH	Dedicated Physical CHannel
ESD	ElectroStatic Discharge
HF	High Frequency
LDMOS	Laterally Diffused Metal Oxide Semiconductor
PAR	Peak-to-Average Ratio
PDPCH	transmission Power of the Dedicated Physical CHannel
PHS	Personal Handy-phone System
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

11. Revision history

Table 10. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF640#3	20150901	Product data sheet	-	BLF640 v.2
Modifications:	• The format of this document has been redesigned to comply with the new identity guidelines of Ampleon. • Legal texts have been adapted to the new company name where appropriate.			
BLF640 v.2	20130411	Product data sheet	-	BLF640 v.1
BLF640 v.1	20121207	Product 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.ampleon.com.

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14. Contents

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