BLP8G20S-80P

Power LDMOS transistor

Rev. 2 — 13 October 2014 Product data sheet

1. Product profile

1.1 General description

80 W LDMOS transistor for base station applications at frequencies from 1800 MHz to 2200 MHz.

Table 1. Typical performance

Typical RF performance per section at T_{case} = 25 °C in a common Doherty demo board.

Test signal	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	300	28	14.2	17	47	–30 [1]
	1880 to 1920	300	28	14.2	16.8	46	–30 [1]
	2110 to 2170	300	28	14.2	16	43	–30 [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

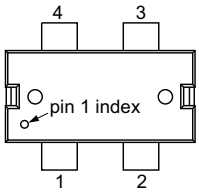
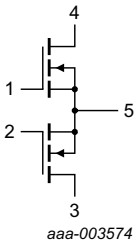
- Designed for broadband operation (1800 MHz to 2200 MHz)
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Internally matched for ease of use
- High power gain
- Integrated ESD protection
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- RF power amplifiers for base station and multi-carrier applications in the 1800 MHz to 2200 MHz frequency range

2. Pinning information

Table 2. Pinning

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

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLP8G20S-80P	HSOP4F	plastic, heatsink small outline package; 4 leads (flat)	SOT1223-1

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	[1]	-	225	°C

[1] Continuous use at maximum temperature will affect the reliability, for details refer to the on-line MTF calculator.

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 = 10 W	0.85	K/W

6. Characteristics

Table 6. DC 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 = 47 mA	1.55	1.9	2.25	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 28 V	-	-	1.2	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	-	8.5	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	120	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 47 mA	-	0.41	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 1.645 A	-	0.32	-	Ω

Table 7. RF characteristics

Test signal: 2-carrier W-CDMA; PAR = 8.4 dB at 0.01 % probability on CCDF; carrier spacing = 5 MHz; 3GPP test model 1; 64 DPCH; f_1 = 1882.5 MHz; f_2 = 1887.5 MHz; f_3 = 1912.5 MHz; f_4 = 1917.5 MHz; RF performance per section at V_{DS} = 28 V; I_{Dq} = 300 mA; T_{case} = 25 °C; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	$P_{L(AV)}$ = 10 W	16.5	17.5	-	dB
η_D	drain efficiency	$P_{L(AV)}$ = 10 W	29	33	-	%
RL_{in}	input return loss	$P_{L(AV)}$ = 10 W	-	−10	−7	dB
ACPR	adjacent channel power ratio	$P_{L(AV)}$ = 10 W	-	−32	−28	dBc

7. Test information

7.1 Ruggedness in class-AB operation

The BLP8G20S-80P is capable of withstanding a load mismatch corresponding to a VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 28 V; I_{Dq} = 300 mA; P_L = 40 W (CW); f = 1805 MHz.

7.2 Impedance information

Table 8. Typical impedance

Measured load-pull data.

f	Z_S [1]	Z_L [1]
(MHz)	(Ω)	(Ω)
1880	2.3 – 14.0j	4.5 – 10.5j
1920	3.0 – 15.7j	4.1 – 10.6j

[1] Z_S and Z_L defined in Figure 1.

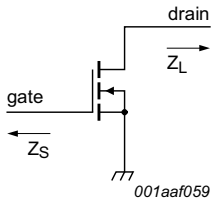
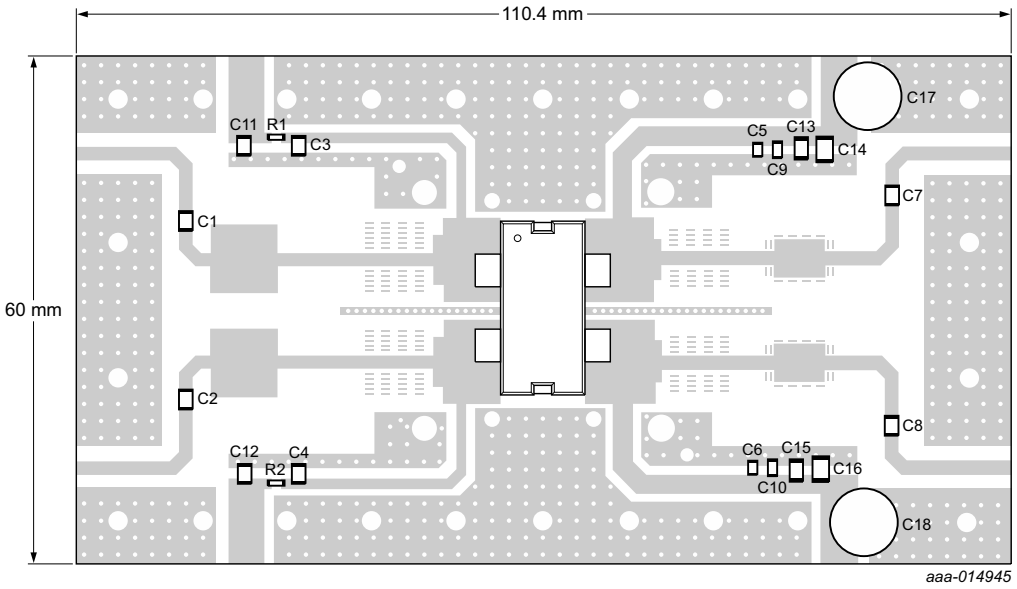


Fig 1. Definition of transistor impedance

7.3 Test circuit



Printed-Circuit Board (PCB): Rogers RO4350; ε_r = 3.48; height = 0.762 mm; thickness copper plating = 35 μm.

See Table 9 for a list of components.

Fig 2. Component layout

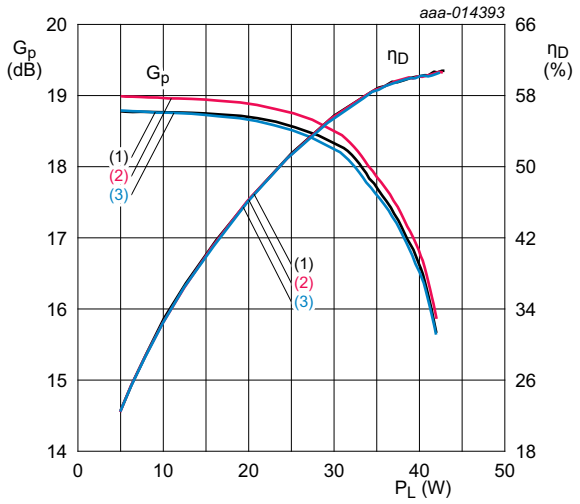
Table 9. List of components

See Figure 2 for component layout.

Component	Description	Value	Remarks
C1, C2, C3, C4, C5, C6, C7, C8	multilayer ceramic chip capacitor	11 pF	ATC 600F series or capacitor of same quality
C9, C10	multilayer ceramic chip capacitor	1 μF, 50 V	Murata or capacitor of same quality
C11, C12, C13, C14, C15, C16	multilayer ceramic chip capacitor	4.7 μF, 50 V	Murata or capacitor of same quality
C17, C18	multilayer ceramic chip capacitor	2200 μF, 50 V	
R1, R2	SMD resistor	9.1 Ω	SMD 0805

7.4 Graphical data

7.4.1 CW



V_{DS} = 28 V; I_{Dq} = 300 mA.

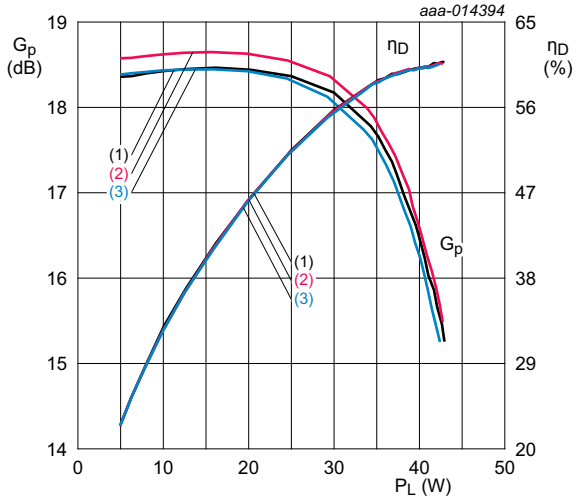
(1) f = 1880 MHz

(2) f = 1900 MHz

(3) f = 1920 MHz

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

7.4.2 Pulsed CW



V_{DS} = 28 V; I_{Dq} = 300 mA.

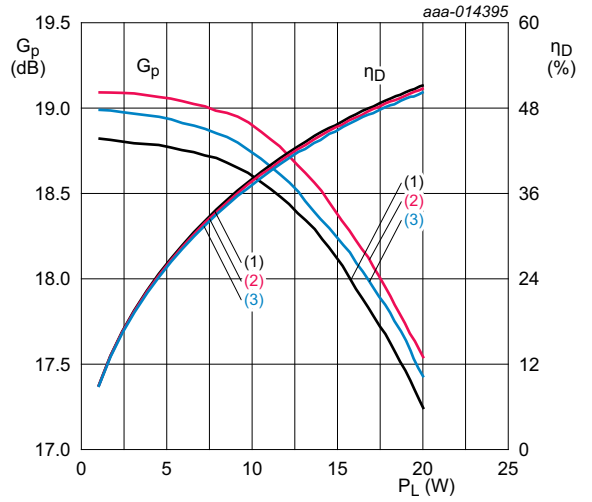
(1) f = 1880 MHz

(2) f = 1900 MHz

(3) f = 1920 MHz

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

7.4.3 1-Carrier W-CDMA



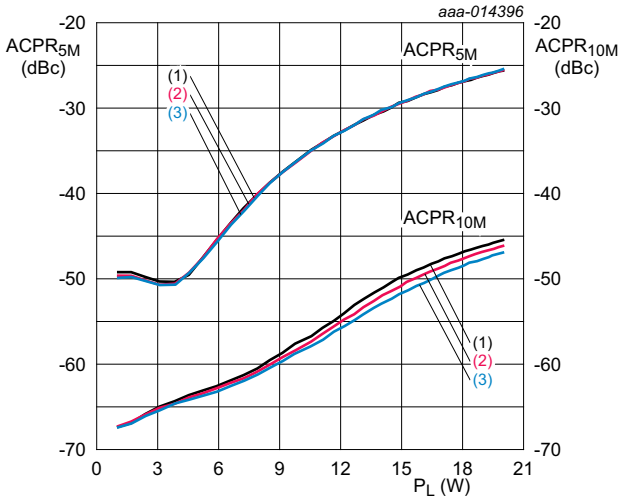
V_{DS} = 28 V; I_{Dq} = 300 mA.

(1) f = 1880 MHz

(2) f = 1900 MHz

(3) f = 1920 MHz

Fig 5. Power gain and drain efficiency as function of output power; typical values



V_{DS} = 28 V; I_{Dq} = 300 mA.

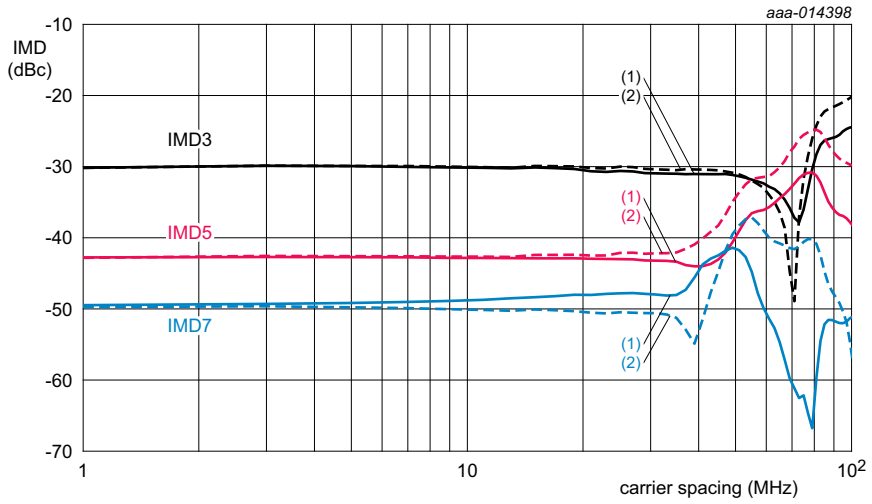
(1) f = 1880 MHz

(2) f = 1900 MHz

(3) f = 1920 MHz

Fig 6. Adjacent channel power ratio (5 MHz) and adjacent channel power ration (10 MHz) as function of output power; typical values

7.4.4 VBW



V_{DS} = 28 V; I_{Dq} = 300 mA; f_c = 1900 MHz.

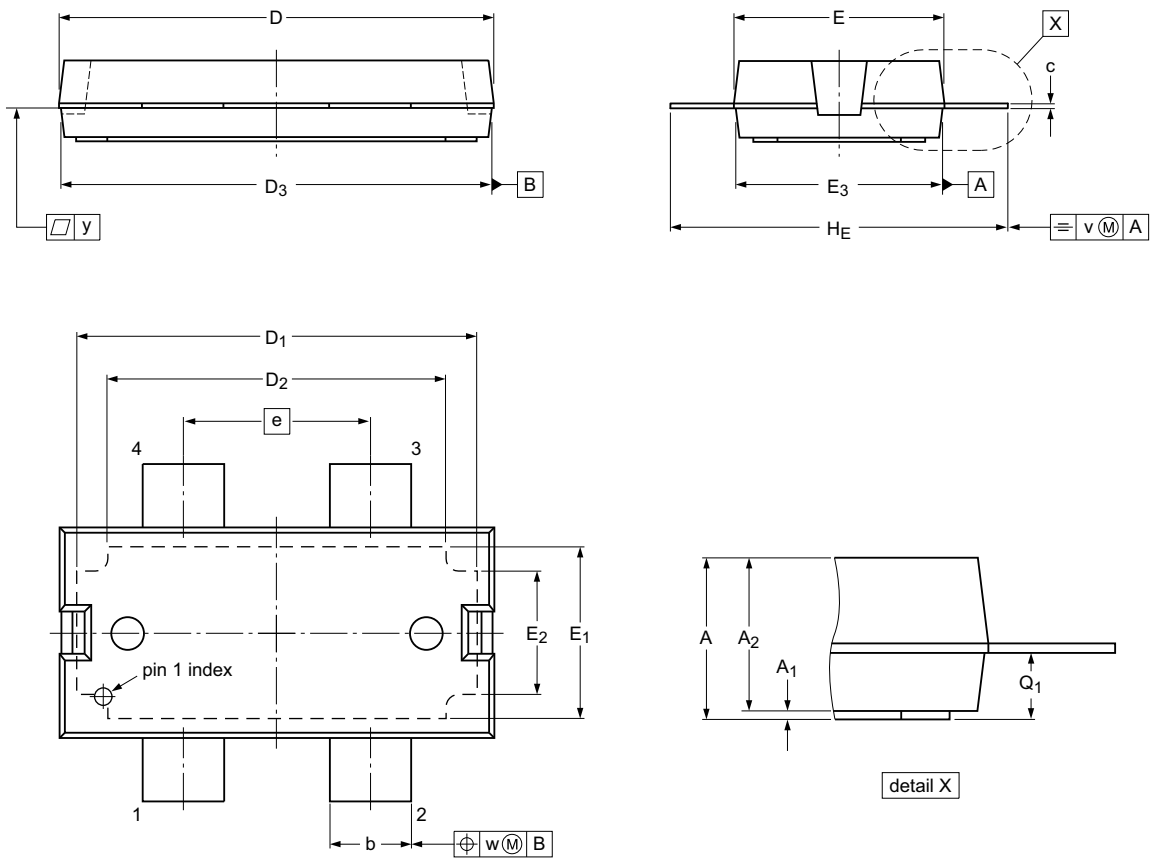
(1) low

(2) high

Fig 7. VBW capacity in class-AB test circuit

8. Package outline

HSOP4F: plastic, heatsink small outline package; 4 leads(flat) **SOT1223-1**



Dimensions (mm are the original dimensions)

Unit		A	A_1	A_2	b	c	$D^{(1)}$	D_1	D_2	D_3	$E^{(1)}$	E_1	E_2	E_3	e	H_E	Q_1	v	w	y
	max	3.9	0.2	3.65	3.90	0.27	20.62	19.00	16.05	20.44	10.01	8.18	5.89	9.83		16.16	1.62			
mm	nom		0.1	3.60	3.85	0.22	20.57	18.95	16.00	20.39	9.96	8.13	5.84	9.78	8.85	15.96	1.57	0.25	0.25	0.1
	min		0	3.55	3.80	0.17	20.52	18.90	15.95	20.34	9.91	8.08	5.79	9.73		15.76	1.52			

Note
1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

sot1223-1_po

Outline version	References				European projection	Issue date
	IEC	JEDEC	JEITA			
SOT1223-1						~~12-04-25~~ 13-10-18

Fig 8. Package outline SOT1223-1 (HSOP4F)

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 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
MTF	Median Time to Failure
PAR	Peak-to-Average Ratio
SMD	Surface Mounted Device
VBW	Video BandWidth
VSWR	Voltage Standing Wave Ratio
W-CDMA	Wideband Code Division Multiple Access

11. Revision history

Table 11. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLP8G20S-80P v.2	20141013	Product data sheet	-	BLP8G20S-80P v.1
Modifications	• Table 1 on page 1: table updated • Section 1.2 on page 1: changed ‘1880 MHz to 1920 MHz’ to ‘1800 MHz to 2200 MHz’ • Section 1.3 on page 1: changed ‘1880 MHz to 1920 MHz’ to ‘1800 MHz to 2200 MHz’ • Table 5 on page 2: table updated • Table 6 on page 3: table updated • Table 7 on page 3: table updated • Section 7 on page 3: section added			
BLP8G20S-80P v.1	20140630	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.

12.2 Definitions

Draft — The document is a draft version only. The content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included herein and shall have no liability for the consequences of use of such information.

Short data sheet — A short data sheet is an extract from a full data sheet with the same product type number(s) and title. A short data sheet is intended for quick reference only and should not be relied upon to contain detailed and full information. For detailed and full information see the relevant full data sheet, which is available on request via the local NXP Semiconductors sales office. In case of any inconsistency or conflict with the short data sheet, the full data sheet shall prevail.

Product specification — The information and data provided in a Product data sheet shall define the specification of the product as agreed between NXP Semiconductors and its customer, unless NXP Semiconductors and customer have explicitly agreed otherwise in writing. In no event however, shall an agreement be valid in which the NXP Semiconductors product is deemed to offer functions and qualities beyond those described in the Product data sheet.

12.3 Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation - lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the *Terms and conditions of commercial sale* of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) will cause permanent damage to the device. Limiting values are stress ratings only and (proper) operation of the device at these or any other conditions above those given in the Recommended operating conditions section (if present) or the Characteristics sections of this document is not warranted. Constant or repeated exposure to limiting values will permanently and irreversibly affect the quality and reliability of the device.

Terms and conditions of commercial sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at http://www.nxp.com/profile/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

No offer to sell or license — Nothing in this document may be interpreted or construed as an offer to sell products that is open for acceptance or the grant, conveyance or implication of any license under any copyrights, patents or other industrial or intellectual property rights.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Non-automotive qualified products — Unless this data sheet expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

Translations — A non-English (translated) version of a document is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

12.4 Trademarks

Notice: All referenced brands, product names, service names and trademarks are the property of their respective owners.

13. Contact information

For more information, please visit: **http://www.nxp.com**

For sales office addresses, please send an email to: **salesaddresses@nxp.com**

14. Contents

1 Product profile 1
1.1 General description 1
1.2 Features and benefits 1
1.3 Applications 1
2 Pinning information 2
3 Ordering information 2
4 Limiting values 2
5 Thermal characteristics 2
6 Characteristics 3
7 Test information 3
7.1 Ruggedness in class-AB operation 3
7.2 Impedance information 3
7.3 Test circuit 4
7.4 Graphical data 5
7.4.1 CW 5
7.4.2 Pulsed CW 5
7.4.3 1-Carrier W-CDMA 6
7.4.4 VBW 6
8 Package outline 7
9 Handling information 8
10 Abbreviations 8
11 Revision history 8
12 Legal information 9
12.1 Data sheet status 9
12.2 Definitions 9
12.3 Disclaimers 9
12.4 Trademarks 10
13 Contact information 10
14 Contents 11

For more information, please visit: http://www.nxp.com
For sales office addresses, please send an email to: salesaddresses@nxp.com

Date of release: 13 October 2014
Document identifier: BLP8G20S-80P