

BLF6G38-10; BLF6G38-10G

WiMAX power LDMOS transistor

Rev. 01 — 3 February 2009

Product data sheet

1. Product profile

1.1 General description

10 W LDMOS power transistor for base station applications at frequencies from 3400 MHz to 3600 MHz.

Table 1. Typical performance

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

Mode of operation	f (MHz)	V _{DS} (V)	P _{L(AV)} (W)	G _p (dB)	η _D (%)	ACPR _{885k} (dBc)	ACPR _{1980k} (dBc)
1-carrier N-CDMA ^[1]	3400 to 3600	28	2	14	20	-49 ^[2]	-64 ^[2]

[1] Single carrier N-CDMA with pilot, paging sync and 6 traffic channels (Walsh codes 8 - 13). PAR = 9.7 dB at 0.01 % probability on CCDF. Channel bandwidth is 1.23 MHz.

[2] Measured within 30 kHz bandwidth.

CAUTION



This device is sensitive to ElectroStatic Discharge (ESD). Therefore care should be taken during transport and handling.

1.2 Features

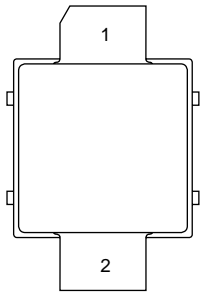
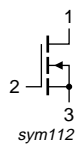
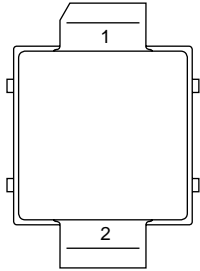
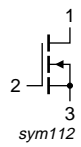
- Typical 1-carrier N-CDMA performance (Single carrier N-CDMA with pilot, paging, sync and 6 traffic channels [Walsh codes 8 - 13]. PAR = 9.7 dB at 0.01 % probability on CCDF. Channel bandwidth is 1.23 MHz), a supply voltage of 28 V and an I_{Dq} of 130 mA:
- Qualified up to a maximum V_{DS} operation of 32 V
- Integrated ESD protection
- Excellent ruggedness
- High efficiency
- Excellent thermal stability
- Designed for broadband operation
- Internally matched for ease of use
- Low gold plating thickness on leads
- Compliant to Directive 2002/95/EC, regarding Restriction of Hazardous Substances (RoHS)

1.3 Applications

- RF power amplifiers for base stations and multi carrier applications in the 3400 MHz to 3600 MHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
BLF6G38-10 (SOT975B)			
1	drain		
2	gate		
3	source		
BLF6G38-10G (SOT975C)			
1	drain		
2	gate		
3	source		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		Version
	Name	Description	
BLF6G38-10	-	earless flanged ceramic package; 2 leads	SOT975B
BLF6G38-10G	-	earless flanged ceramic package; 2 leads	SOT975C

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
I_D	drain current		-	3.1	A
T_{stg}	storage temperature		-65	+150	°C
T_j	junction temperature		-	200	°C

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Type	Typ	Unit
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}$; $P_L = 10\text{ W (CW)}$	BLF6G38-10	4.0	K/W
			BLF6G38-10G	4.0	K/W

6. Characteristics

Table 6. Characteristics

$T_j = 25\text{ °C}$ per section; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$; $I_D = 0.18\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}$; $I_D = 18\text{ mA}$	1.4	1.9	2.4	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}$; $V_{DS} = 28\text{ V}$	-	-	1.4	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $V_{DS} = 10\text{ V}$	2.7	-	-	A
I_{GSS}	gate leakage current	$V_{GS} = 11\text{ V}$; $V_{DS} = 0\text{ V}$	-	-	140	nA
g_{fs}	forward transconductance	$V_{DS} = 10\text{ V}$; $I_D = 0.9\text{ A}$	0.8	-	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $I_D = 0.6\text{ A}$	328	-	1256	m Ω
C_{rs}	feedback capacitance	$V_{GS} = 0\text{ V}$; $V_{DS} = 28\text{ V}$; $f = 1\text{ MHz}$	-	3.6	-	pF

7. Application information

Table 7. Application information

Mode of operation: Single carrier N-CDMA with pilot, paging, sync and 6 traffic channels (Walsh codes 8 - 13). PAR 9.7 dB at 0.01 % probability on CCDF; Channel Bandwidth is 1.23 MHz; $f_1 = 3400$ MHz; $f_2 = 3500$ MHz; $f_3 = 3600$ MHz; RF performance at $V_{DS} = 28$ V; $I_{Dq} = 130$ mA; $T_{case} = 25$ °C; unless otherwise specified; in a class-AB production circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$P_{L(AV)}$	average output power		-	2	-	W
G_p	power gain	$P_{L(AV)} = 2$ W	13	14	-	dB
RL_{in}	input return loss	$P_{L(AV)} = 2$ W	-	-10	-	dB
η_D	drain efficiency	$P_{L(AV)} = 2$ W	18	20	-	%
$ACPR_{885k}$	adjacent channel power ratio (885 kHz)	$P_{L(AV)} = 2$ W [1]	-	-49	-46	dBc
$ACPR_{1980k}$	adjacent channel power ratio (1980 kHz)	$P_{L(AV)} = 2$ W [1]	-	-64	-61	dBc

[1] Measured within 30 kHz bandwidth.

7.1 Ruggedness in class-AB operation

The BLF6G38-10 and BLF6G38-10G are capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 28$ V; $I_{Dq} = 130$ mA; $P_L = P_{L(1dB)}$; $f = 3600$ MHz.

7.2 NXP WiMAX signal

7.2.1 WiMAX signal description

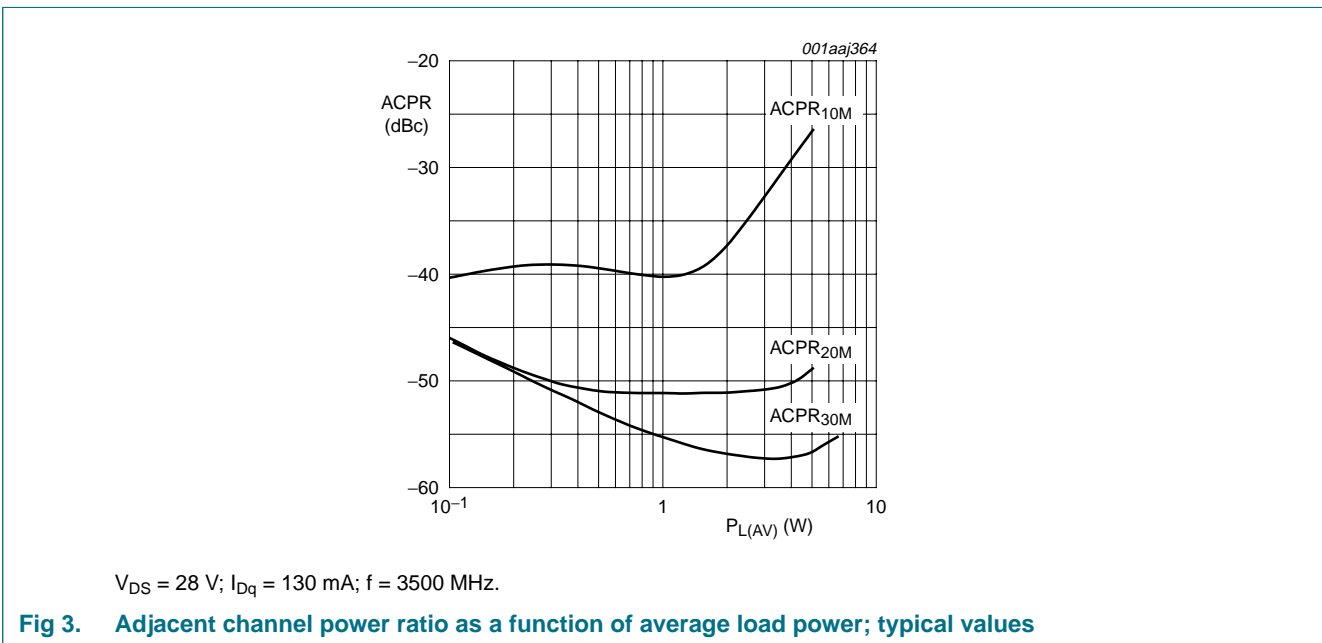
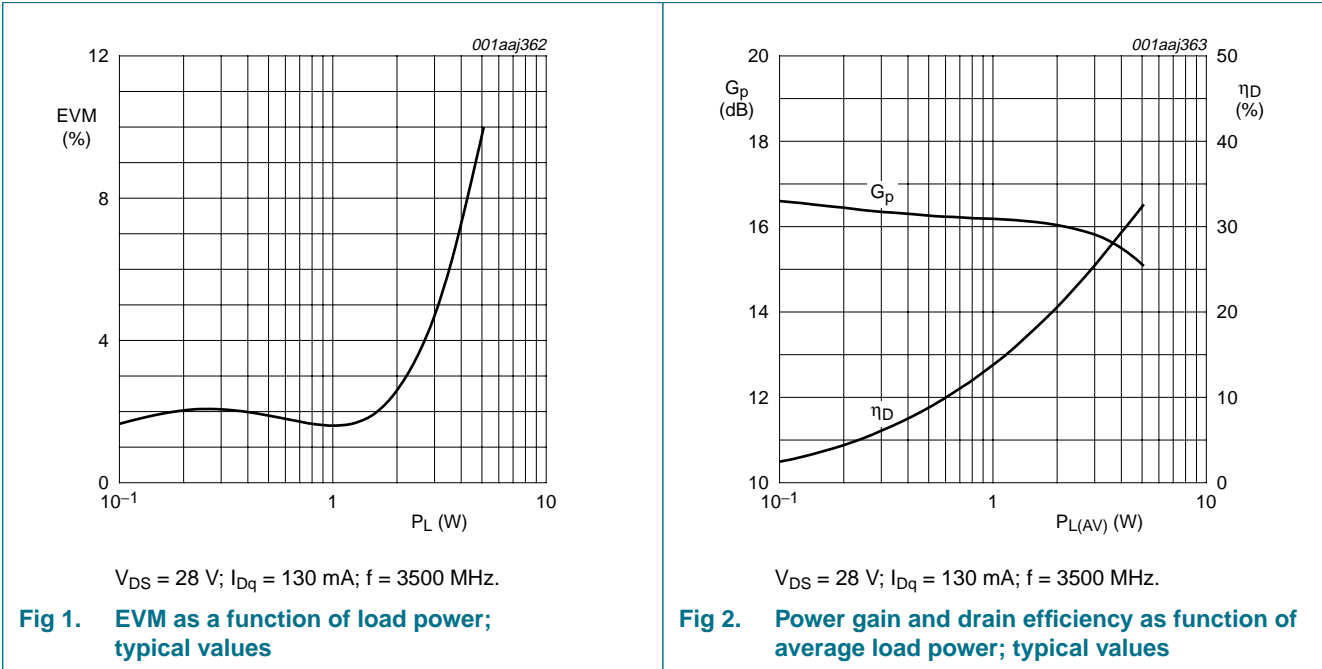
frame duration = 5 ms; bandwidth = 10 MHz; sequency = 1 frame;
 frequency band = WCS; sampling rate = 11.2 MHz; $n = 8 / 7$; $G = T_g / T_b = 1 / 8$;
 FFT = 1024; zone type = PUSC; $\delta = 97.7$ %; number of symbols = 46;
 number of subchannels = 30; PAR = 9.5 dB.

Preamble: 1 symbol \times 30 subchannels; $P_L = P_{L(nom)} + 3.86$ dB.

Table 8. Frame structure

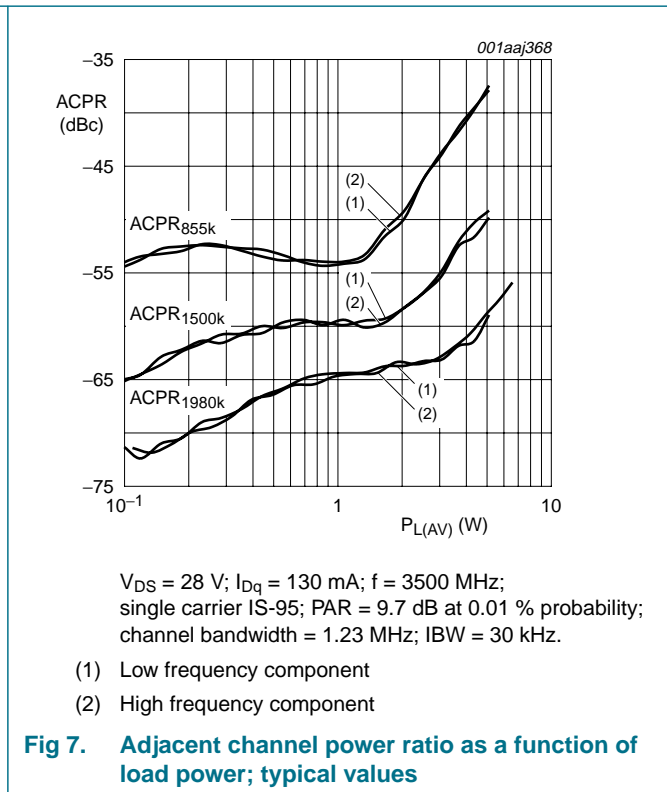
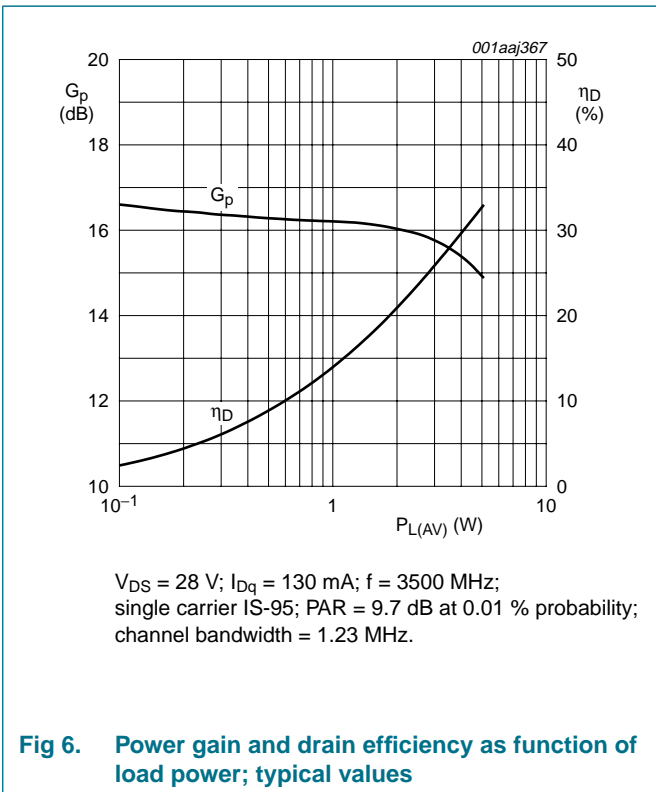
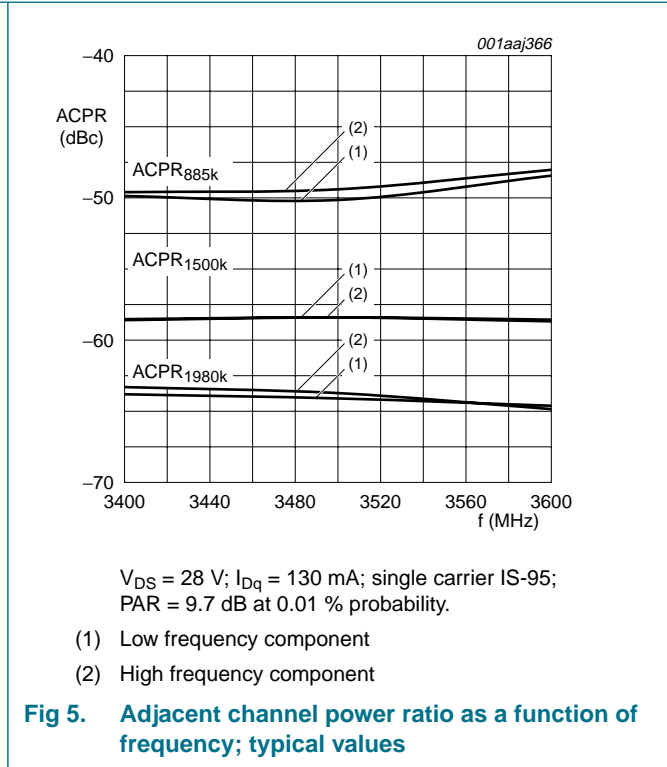
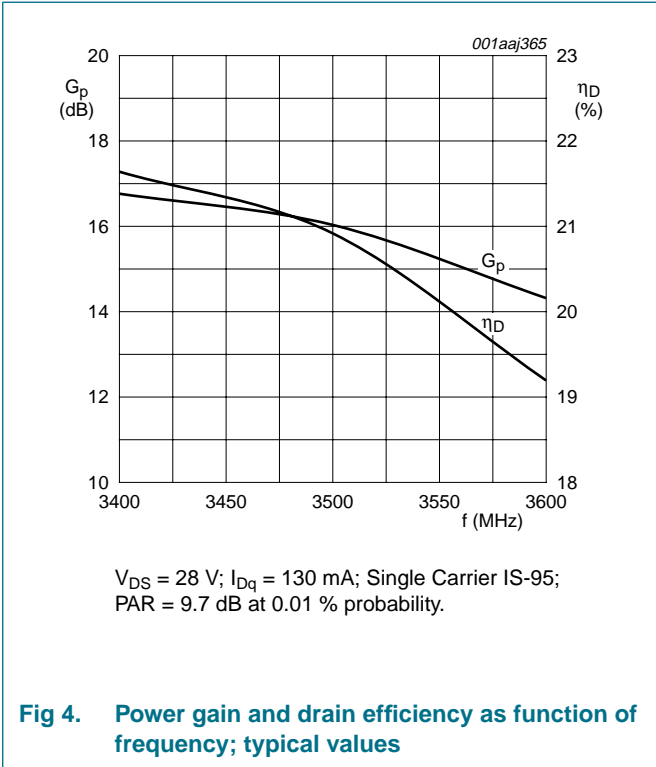
Frame contents	Modulation technique	Data length
Zone 0 FCH 2 symbols \times 4 subchannels	QPSK1/2	3 bit
Zone 0 data 2 symbols \times 26 subchannels	64QAM3/4	692 bit
Zone 0 data 44 symbols \times 30 subchannels	64QAM3/4	10000 bit

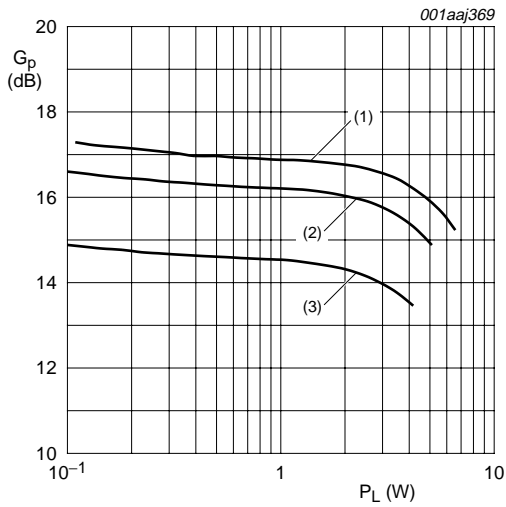
7.2.2 Graphs



7.3 Single carrier NA IS-95 broadband performance at 2 W average

7.3.1 Graphs

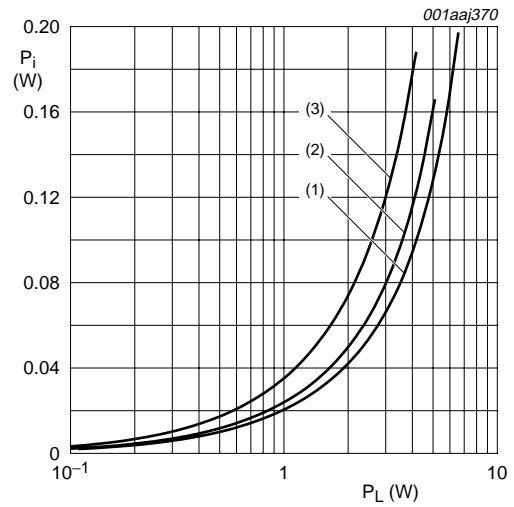




$V_{DS} = 28\text{ V}$; $I_{Dq} = 130\text{ mA}$; single carrier IS-95;
 PAR = 9.7 dB at 0.01 % probability;
 channel bandwidth = 1.23 MHz.

- (1) $f = 3400\text{ MHz}$
- (2) $f = 3500\text{ MHz}$
- (3) $f = 3600\text{ MHz}$

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

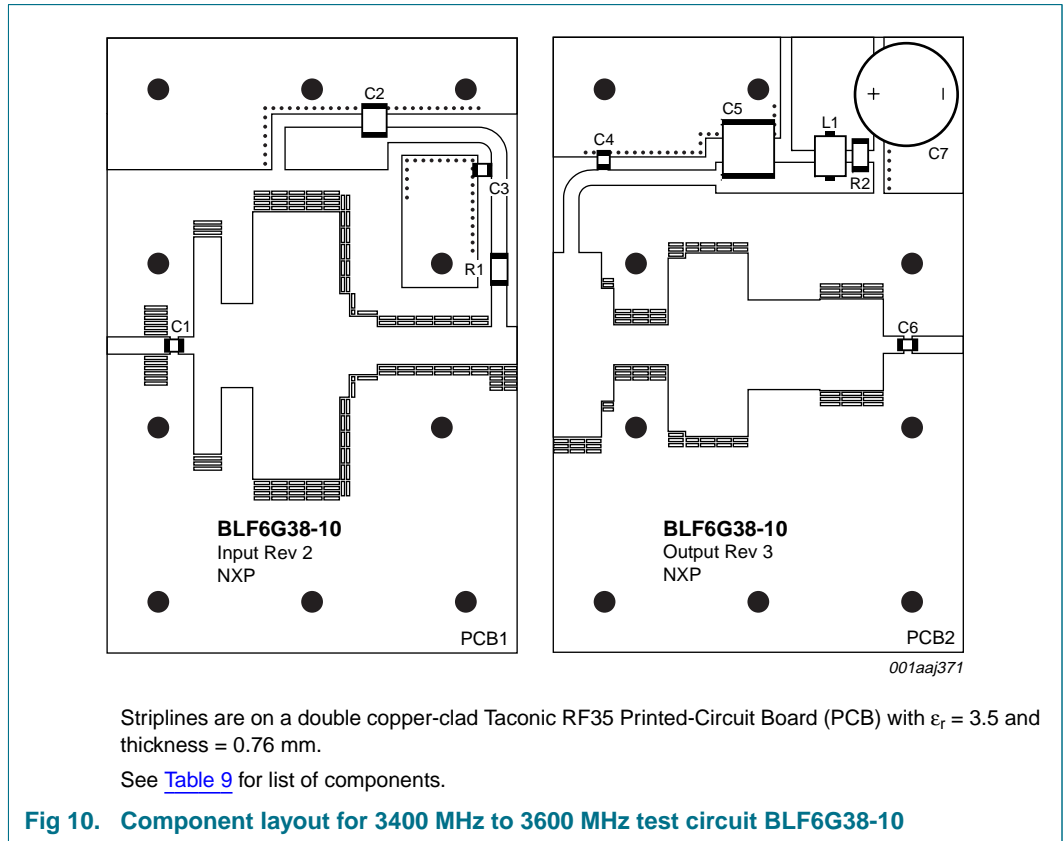


$V_{DS} = 28\text{ V}$; $I_{Dq} = 130\text{ mA}$; single carrier IS-95;
 PAR = 9.7 dB at 0.01 % probability;
 channel bandwidth = 1.23 MHz.

- (1) $f = 3400\text{ MHz}$
- (2) $f = 3500\text{ MHz}$
- (3) $f = 3600\text{ MHz}$

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

8. Test information



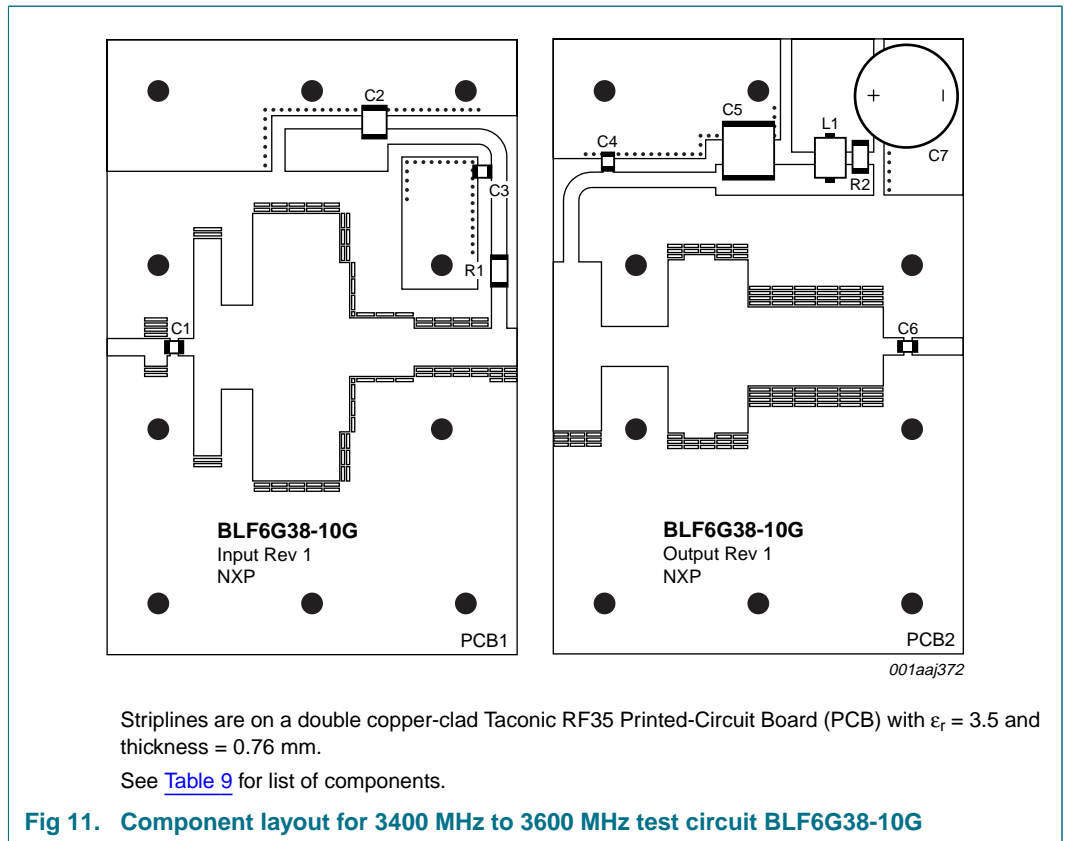


Table 9. List of components

For test circuit, see [Figure 10](#) and [Figure 11](#).

Component	Description	Value	Remarks
C1, C3, C6	multilayer ceramic chip capacitor	20 pF	ATC 100A
C2	multilayer ceramic chip capacitor	1.5 μ F	TDK
C4	multilayer ceramic chip capacitor	6.8 μ F	ATC 100A
C5	multilayer ceramic chip capacitor	10 μ F; 50 V	TDK
C7	electrolytic capacitor	220 μ F; 63 V	Elco
L1	ferrite SMD bead	-	Ferroxcube bead
R1, R2	SMD resistor	8.2 Ω	Thin film

Table 10. Measured test circuit impedances

f (GHz)	Z _i (Ω)	Z _o (Ω)
BLF6G38-10		
3.40	12.61 - j23.96	5.21 - j6.31
3.45	14.16 - j22.23	5.47 - j6.01
3.50	16.00 - j21.74	5.72 - j5.87
3.55	17.43 - j22.91	5.90 - j5.91
3.60	17.11 - j25.43	5.92 - j6.09
BLF6G38-10G		
3.40	19.33 - j22.54	4.71 - j7.09
3.45	21.20 - j21.65	4.75 - j6.82
3.50	23.02 - j22.41	4.72 - j6.65
3.55	23.70 - j24.95	4.60 - j6.55
3.60	21.98 - j28.26	4.36 - j6.47

9. Package outline

Earless flanged ceramic package; 2 leads

SOT975B

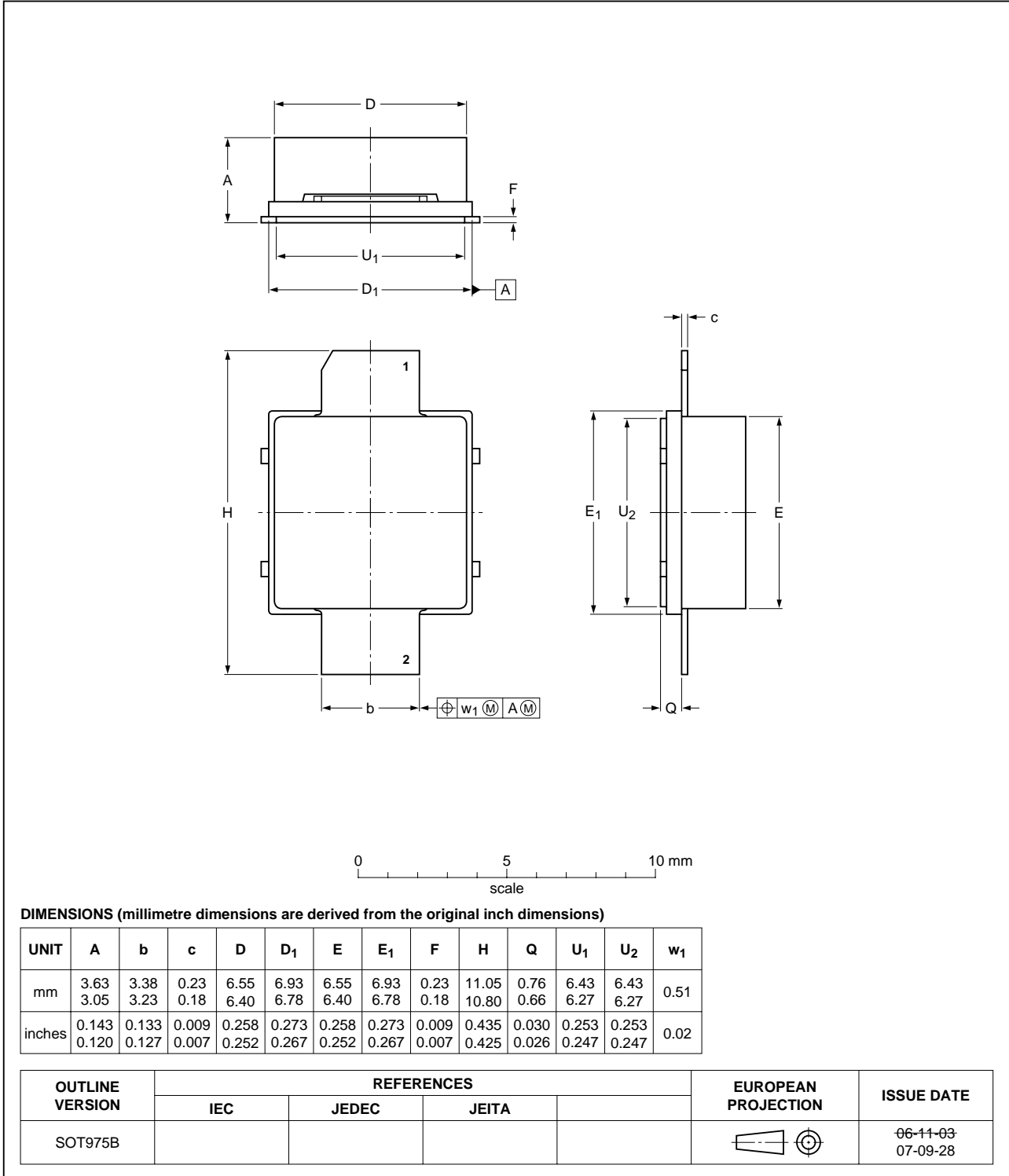


Fig 12. Package outline SOT975B

Earless flanged ceramic package; 2 leads

SOT975C

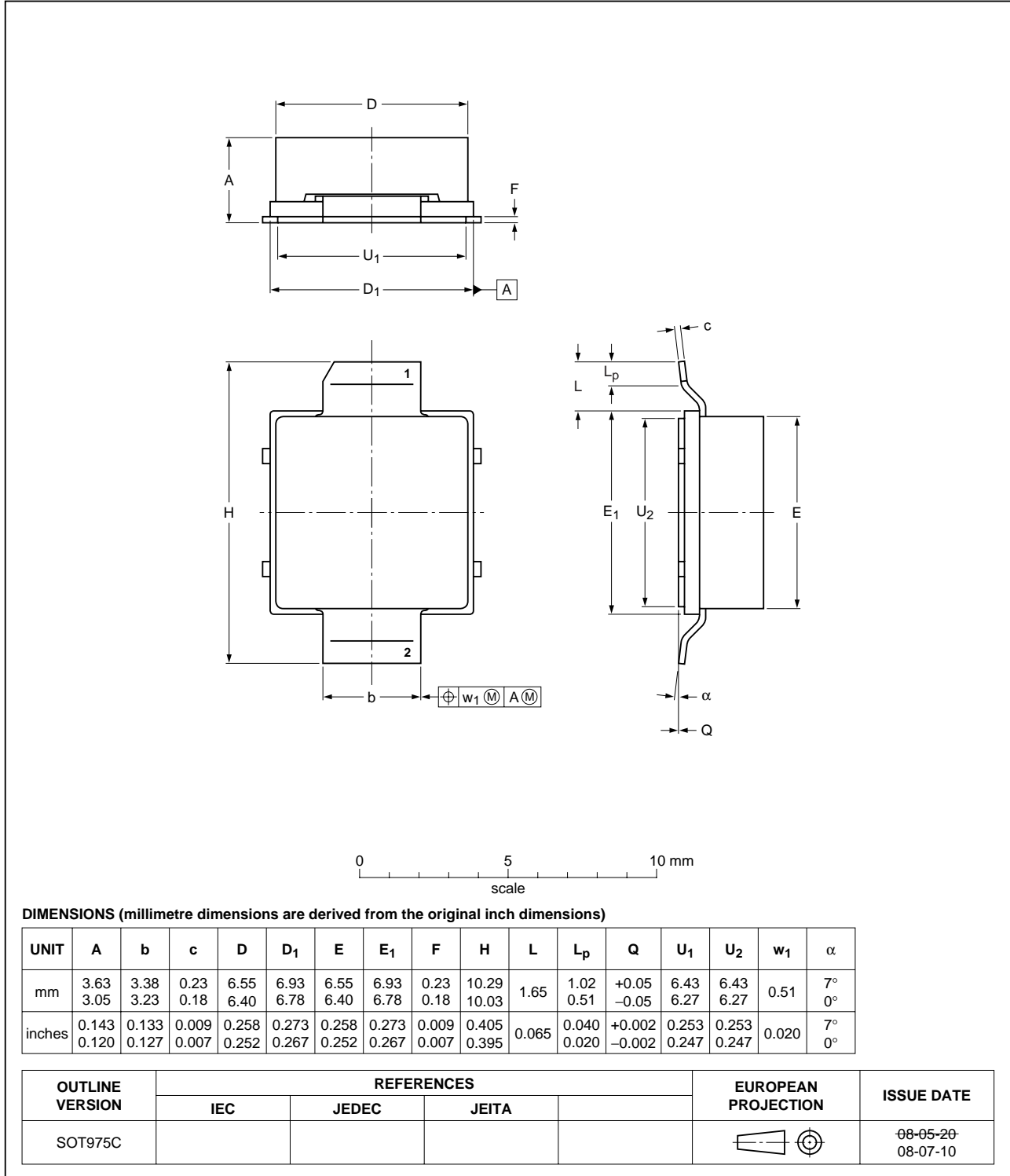


Fig 13. Package outline SOT975C

10. Abbreviations

Table 11. Abbreviations

Acronym	Description
CCDF	Complementary Cumulative Distribution Function
CW	Continuous Wave
EVM	Error Vector Magnitude
FCH	Frame control Header
FFT	Fast Fourier Transform
IBW	Instantaneous BandWidth
IS-95	Interim Standard 95
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
NA	North American
N-CDMA	Narrowband Code Division Multiple Access
PAR	Peak-to-Average power Ratio
PUSC	Partial Usage of SubChannels
RF	Radio Frequency
SMD	Surface Mounted Device
VSWR	Voltage Standing-Wave Ratio
WCS	Wireless Communications Service
WiMAX	Worldwide Interoperability for Microwave Access

11. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLF6G38-10_BLF6G38-10G_1	20090203	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.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.

12.3 Disclaimers

General — 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.

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 medical, military, aircraft, space or life support 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 accepts 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.

Limiting values — Stress above one or more limiting values (as defined in the Absolute Maximum Ratings System of IEC 60134) may cause permanent damage to the device. Limiting values are stress ratings only and operation of the device at these or any other conditions above those given in the Characteristics sections of this document is not implied. Exposure to limiting values for extended periods may affect device reliability.

Terms and conditions of 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>, including those pertaining to warranty, intellectual property rights infringement and limitation of liability, unless explicitly otherwise agreed to in writing by NXP Semiconductors. In case of any inconsistency or conflict between information in this document and such terms and conditions, the latter will prevail.

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.

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 1

1.3 Applications 2

2 Pinning information 2

3 Ordering information 2

4 Limiting values 3

5 Thermal characteristics 3

6 Characteristics 3

7 Application information 4

7.1 Ruggedness in class-AB operation 4

7.2 NXP WiMAX signal 4

7.2.1 WiMAX signal description 4

7.2.2 Graphs 5

7.3 Single carrier NA IS-95 broadband performance at 2 W average 6

7.3.1 Graphs 6

8 Test information 8

9 Package outline 11

10 Abbreviations 13

11 Revision history 13

12 Legal information 14

12.1 Data sheet status 14

12.2 Definitions 14

12.3 Disclaimers 14

12.4 Trademarks 14

13 Contact information 14

14 Contents 15

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

