

NXP BLF8G10LS-300P transistor datasheet

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300 W LDMOS power transistor for base station applications at frequencies from 700 MHz to 1000 MHz.

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BLF8G10LS-300P

Power LDMOS transistor

Rev. 2 — 17 December 2013

Product data sheet

1. Product profile

1.1 General description

300 W LDMOS power transistor for base station applications at frequencies from 700 MHz to 1000 MHz.

Table 1. Typical performance

Typical RF performance at $T_{case} = 25\text{ °C}$ 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	758 to 803	28	65	20.5	32	-35 [1]

[1] Test signal: 3GPP test model 1; 1 to 64 DPCH; PAR = 7.2 dB at 0.01 % probability on CCDF per carrier; carrier spacing 5 MHz.

1.2 Features and benefits

- Excellent ruggedness
- High efficiency
- Low thermal resistance providing excellent thermal stability
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent pre-distortability
- Internally matched for ease of use
- Integrated ESD protection
- Compliant to Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC

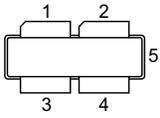
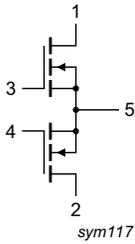
1.3 Applications

- RF power amplifier for multi standards and multi carrier applications in the 700 MHz to 1000 MHz frequency range



2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain1		
2	drain2		
3	gate1		
4	gate2		
5	source		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLF8G10LS-300P	-	earless flanged balanced ceramic package; 4 leads	SOT539B

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
$R_{th(j-case)}$	thermal resistance from junction to case	$T_{case} = 80\text{ °C}$; $P_L = 65\text{ W}$	0.29	K/W

6. Characteristics

Table 6. DC characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}$; $I_D = 2.2\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 20\text{ V}$; $I_D = 220\text{ mA}$	1.5	1.9	2.3	V
V_{GSq}	gate-source quiescent voltage	$V_{DS} = 28\text{ V}$; $I_D = 1000\text{ mA}$	-	2.0	-	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}$; $V_{DS} = 28\text{ V}$	-	-	2.4	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $V_{DS} = 20\text{ V}$	-	38.1	-	A
I_{GSS}	gate leakage current	$V_{GS} = 11\text{ V}$; $V_{DS} = 0\text{ V}$	-	-	240	nA
g_{fs}	forward transconductance	$V_{DS} = 20\text{ V}$; $I_D = 11\text{ A}$	-	15.0	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}$; $I_D = 7.7\text{ A}$	-	0.086	-	Ω

Table 7. RF characteristics

Test signal: 2-carrier W-CDMA; PAR = 7.2 dB at 0.01 % probability on CCDF; 3GPP test model 1; 1 to 64 DPCH; $f_1 = 760.5\text{ MHz}$; $f_2 = 765.5\text{ MHz}$; $f_3 = 795.5\text{ MHz}$; $f_4 = 800.5\text{ MHz}$; RF performance at $V_{DS} = 28\text{ V}$; $I_{Dq} = 2000\text{ mA}$; $T_{case} = 25\text{ }^\circ\text{C}$; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	$P_{L(AV)} = 65\text{ W}$	19.5	20.5	-	dB
RL_{in}	input return loss	$P_{L(AV)} = 65\text{ W}$	-	-12	-8	dB
η_D	drain efficiency	$P_{L(AV)} = 65\text{ W}$	28	32	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 65\text{ W}$	-	-35	-32	dBc

7. Test information

7.1 Ruggedness in class-AB operation

The BLF8G10LS-300P is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 28\text{ V}$; $I_{Dq} = 2000\text{ mA}$; $P_L = 65\text{ W}$ (2-carrier W-CDMA); $f = 758\text{ MHz}$.

7.2 Impedance information

Table 8. Typical impedance

Measured load-pull data per section; $I_{DQ} = 1000 \text{ mA}$; $V_{DS} = 28 \text{ V}$

f (MHz)	Z_S ^[1] (Ω)	Z_L ^[1] (Ω)	$P_{L(3dB)}$ (W)
720	2.3 – j2.8	1.6 – j2.7	204.4
746	2.5 – j3.2	1.7 – j2.6	220.0
757	2.3 – j3.6	1.6 – j2.5	225.2
769	2.6 – j3.6	1.7 – j2.4	227.9
791	2.6 – j3.9	1.5 – j2.8	214.8
805	2.6 – j3.9	1.8 – j2.3	207.2
820	2.7 – j4.2	1.6 – j2.1	228.5
869	2.8 – j4.1	1.2 – j2.1	217.2
881	2.9 – j4.4	1.2 – j2.1	219.9
894	3.3 – j4.7	1.1 – j2.1	215.4
925	3.6 – j5.2	1.2 – j2.1	223.5
942	4.1 – j 5.7	1.1 – j2.2	220.5
960	4.7 – j5.9	1.1 – j2.2	218.8

[1] Z_S and Z_L defined in [Figure 1](#).

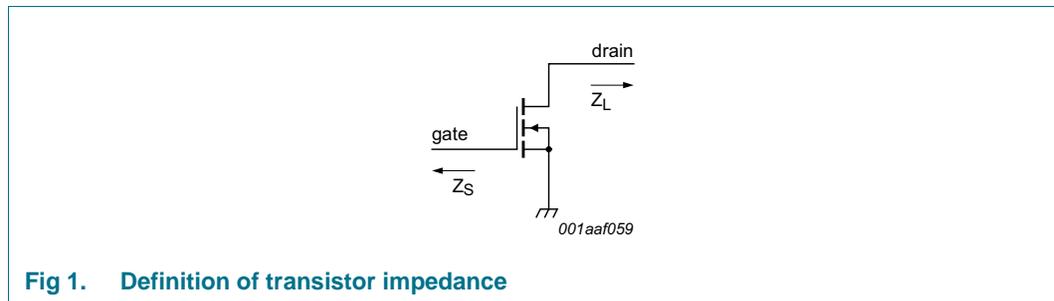


Fig 1. Definition of transistor impedance

7.3 Test circuit

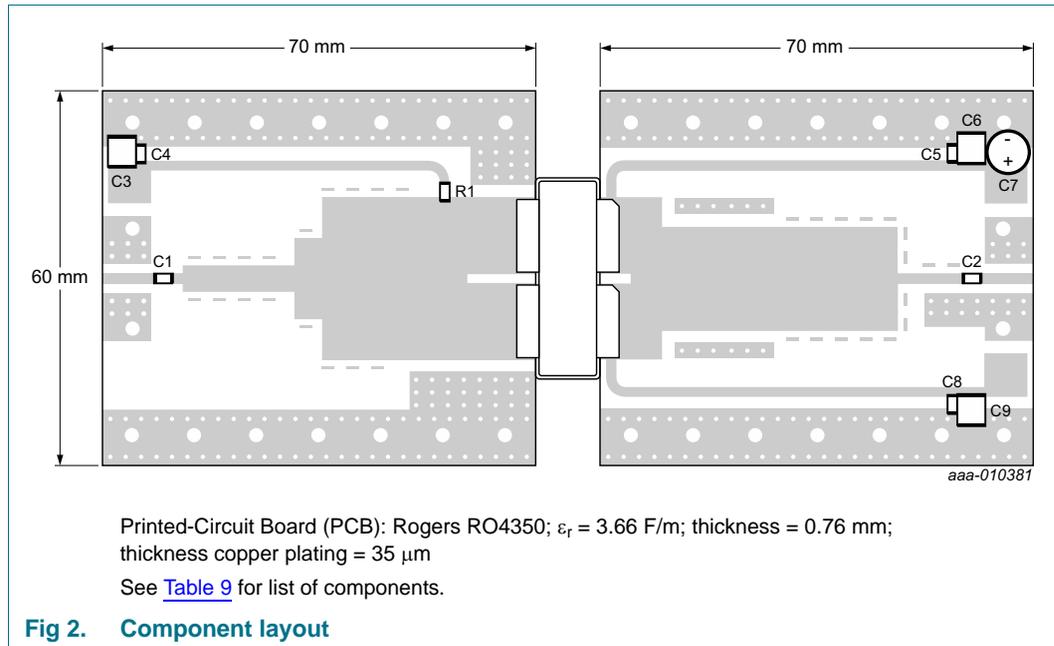


Table 9. List of components

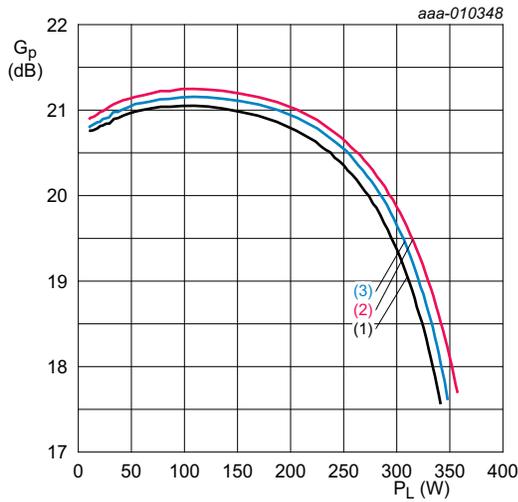
See [Figure 2](#) for component layout.

Component	Description	Value	Remarks
C1, C2	multilayer ceramic chip capacitor	82 pF	ATC 800B
C3, C6, C9	multilayer ceramic chip capacitor	10 μF , 50 V	Murata
C4, C5, C8	multilayer ceramic chip capacitor	82 pF	ATC 100B
C7	electrolytic capacitor	470 μF , 63 V	
R1	chip resistor	4.7 Ω	SMD 1206

7.4 Graphical data

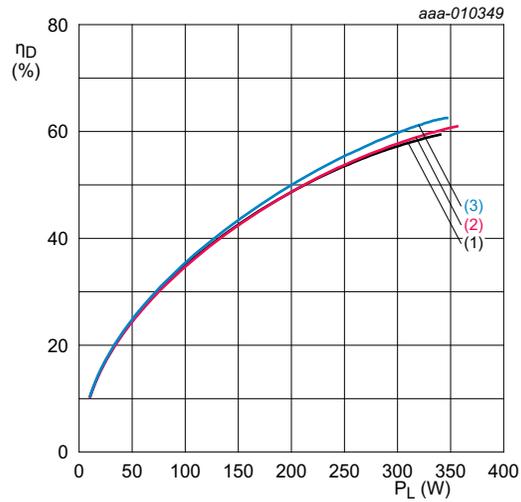
Following are typical RF measurements of the BLF8G10LS-300P in its class-AB test circuit.

7.4.1 CW pulsed



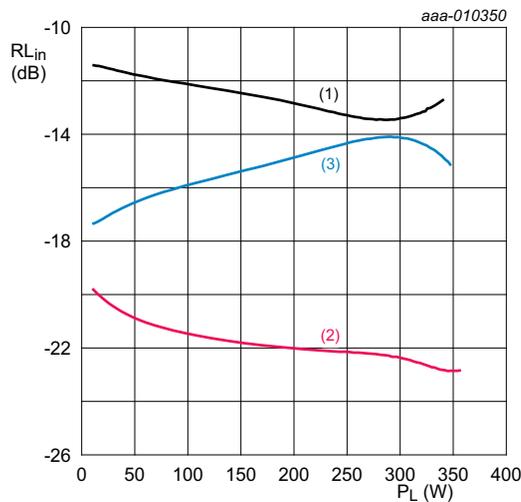
$V_{DS} = 28\text{ V}; I_{DQ} = 2000\text{ mA}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$
 (1) $f = 758\text{ MHz}$
 (2) $f = 780.5\text{ MHz}$
 (3) $f = 803\text{ MHz}$

Fig 3. Power gain as a function of output power; typical values



$V_{DS} = 28\text{ V}; I_{DQ} = 2000\text{ mA}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$
 (1) $f = 758\text{ MHz}$
 (2) $f = 780.5\text{ MHz}$
 (3) $f = 803\text{ MHz}$

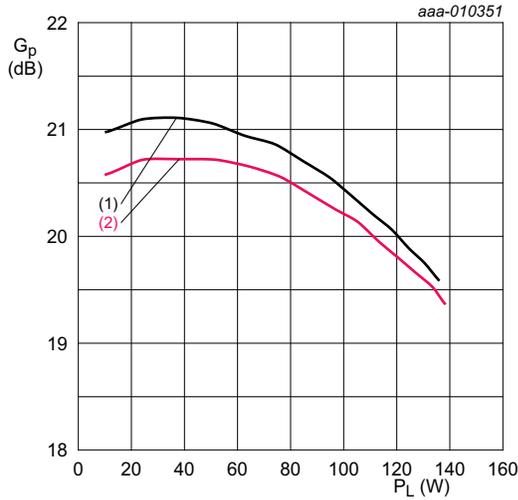
Fig 4. Drain efficiency as a function of output power; typical values



$V_{DS} = 28\text{ V}; I_{DQ} = 2000\text{ mA}; t_p = 100\text{ }\mu\text{s}; \delta = 10\text{ }\%$
 (1) $f = 758\text{ MHz}$
 (2) $f = 780.5\text{ MHz}$
 (3) $f = 803\text{ MHz}$

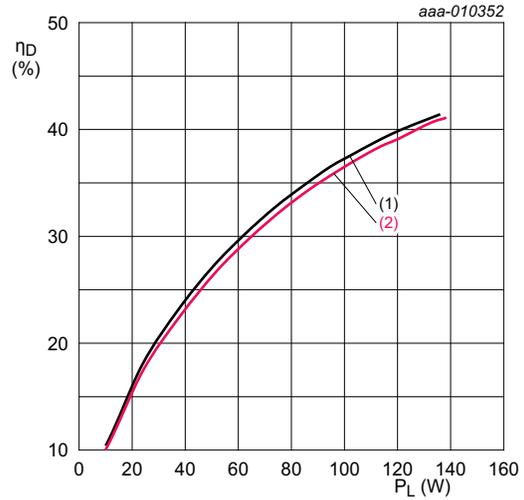
Fig 5. Input return loss as a function of output power; typical values

7.4.2 1-Carrier W-CDMA



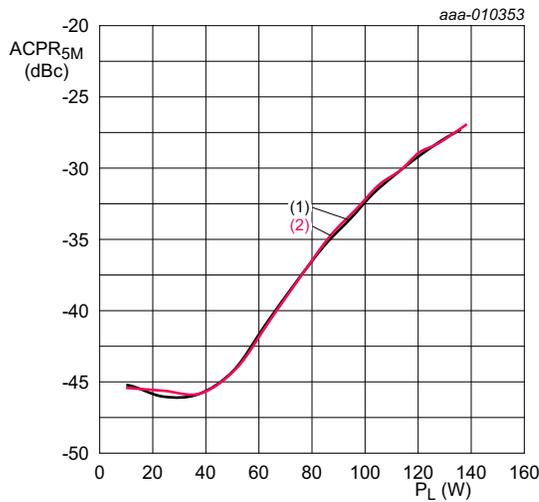
$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}.$
 (1) $f = 758\text{ MHz}$
 (2) $f = 803\text{ MHz}$

Fig 6. Power gain as a function of output power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}.$
 (1) $f = 758\text{ MHz}$
 (2) $f = 803\text{ MHz}$

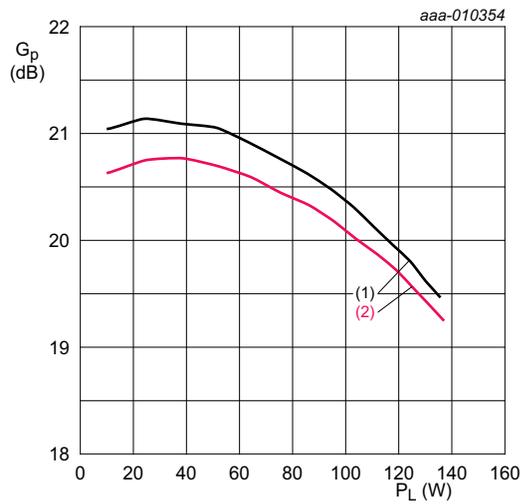
Fig 7. Drain efficiency as a function of output power; typical values



$V_{DS} = 28\text{ V}; I_{Dq} = 2000\text{ mA}.$
 (1) $f = 758\text{ MHz}$
 (2) $f = 803\text{ MHz}$

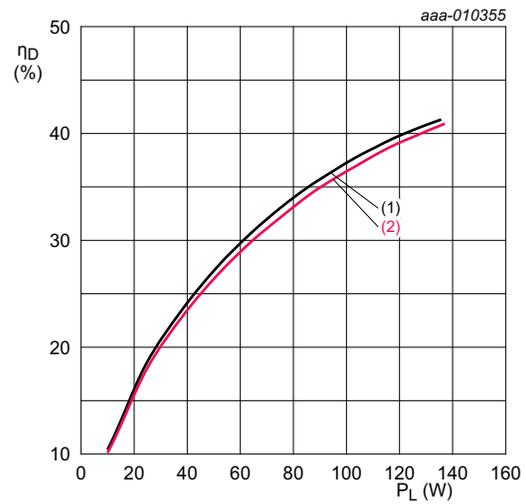
Fig 8. Adjacent channel power ratio (5 MHz) as a function of output power; typical values

7.4.3 2-Carrier W-CDMA



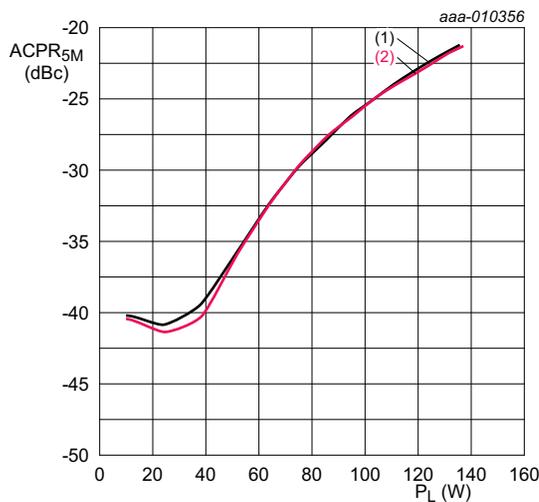
$V_{DS} = 28\text{ V}; I_{DQ} = 2000\text{ mA}$.
 (1) $f = 758\text{ MHz}$
 (2) $f = 803\text{ MHz}$

Fig 9. Power gain as a function of output power; typical values



$V_{DS} = 28\text{ V}; I_{DQ} = 2000\text{ mA}$.
 (1) $f = 758\text{ MHz}$
 (2) $f = 803\text{ MHz}$

Fig 10. Drain efficiency as a function of output power; typical values



$V_{DS} = 28\text{ V}; I_{DQ} = 2000\text{ mA}$.
 (1) $f = 758\text{ MHz}$
 (2) $f = 803\text{ MHz}$

Fig 11. Adjacent channel power ratio (5 MHz) as a function of output power; typical values

8. Package outline

Earless flanged balanced ceramic package; 4 leads

SOT539B

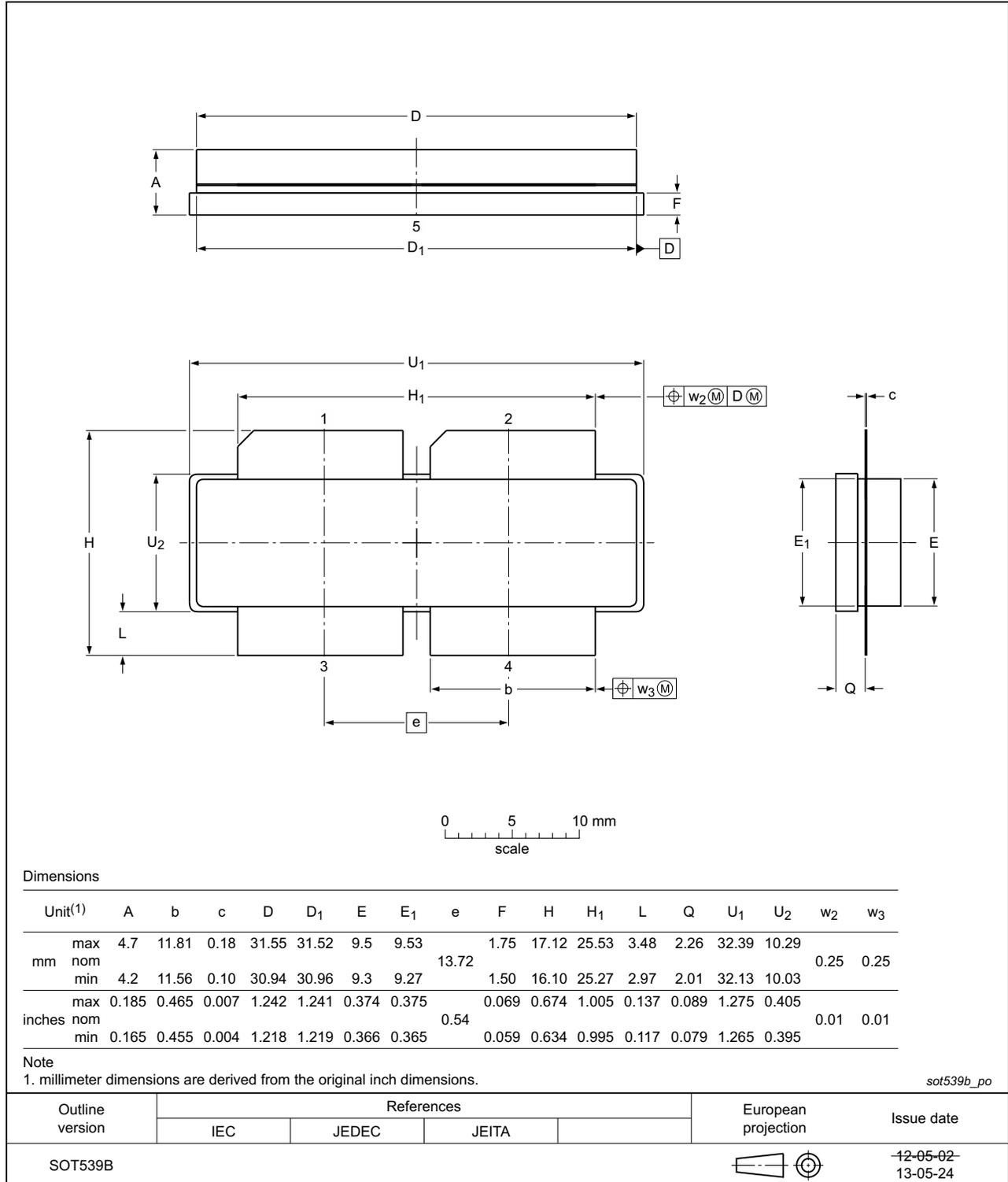


Fig 12. Package outline SOT539B

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
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
BLF8G10LS-300P v.2	20131217	Product data sheet	-	BLF8G10LS-300P v.1
Modifications	<ul style="list-style-type: none"> • Table 1 on page 1: table updated • Table 5 on page 2: table updated • Table 6 on page 3: table updated • Table 7 on page 3: table updated • Table 8 on page 4: table updated • Section 7.1 on page 3: section updated • Section 7.3 on page 5: section added • Section 7.4 on page 5: section added 			
BLF8G10LS-300P v.1	20131118	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".

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