

BLC8G27LS-240AV

Power LDMOS transistor

Rev. 5 — 2 December 2016

AMPLEON

Product data sheet

1. Product profile

1.1 General description

240 W LDMOS packaged asymmetric Doherty power transistor for base station applications at frequencies from 2500 MHz to 2700 MHz.

Table 1. Typical performance

Typical RF performance at $T_{case} = 25\text{ °C}$ in an asymmetrical Doherty demo board. $V_{DS} = 28\text{ V}$; $I_{DQ} = 500\text{ mA}$ (main); $V_{GS(amp)peak} = 0.5\text{ V}$, unless otherwise specified.

Test signal	f	V_{DS}	$P_{L(AV)}$	G_p	η_D	ACPR
	(MHz)	(V)	(W)	(dB)	(%)	(dBc)
1-carrier W-CDMA	2500 to 2690	28	56	14.5	43	-35 [1]

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

1.2 Features and benefits

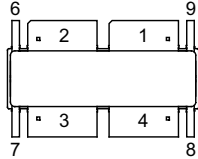
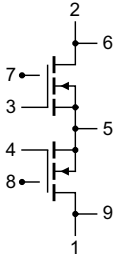
- Excellent ruggedness
- High-efficiency
- Low thermal resistance providing excellent thermal stability
- Designed for broadband operation (2500 MHz to 2700 MHz)
- Asymmetric design to achieve optimum efficiency across the band
- Lower output capacitance for improved performance in Doherty applications
- Designed for low memory effects providing excellent digital pre-distortion capability
- Internally matched for ease of use
- Integrated ESD protection
- 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 2500 MHz to 2700 MHz frequency range

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	drain2 (peak)		 <p style="text-align: right; font-size: small;">aaa-009150</p>
2	drain1 (main)		
3	gate1 (main)		
4	gate2 (peak)		
5	source ^[1]		
6	video decoupling (main)		
7	n.c.		
8	n.c.		
9	video decoupling (peak)		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLC8G27LS-240AV	-	plastic earless flanged cavity package; 8 leads	SOT1252-1

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
$V_{GS(amp)main}$	main amplifier gate-source voltage		-0.5	+13	V
$V_{GS(amp)peak}$	peak amplifier 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 online MTF calculator.

5. Thermal characteristics

Table 5. Thermal characteristics

Symbol	Parameter	Conditions	Typ	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	$V_{DS} = 28\text{ V}$; $I_{DQ} = 500\text{ mA}$ (main); $V_{GS(amp)peak} = 0.5\text{ V}$; $T_{case} = 80\text{ °C}$; $P_L = 56\text{ W}$	0.3	K/W

6. Characteristics

Table 6. DC characteristics

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Main device						
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 1.8\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 180\text{ mA}$	1.5	1.9	2.3	V
V_{GSq}	gate-source quiescent voltage	$V_{DS} = 28\text{ V}; I_D = 540\text{ mA}$	1.6	2.1	2.4	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	2.8	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	30	-	A
I_{GSS}	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	280	nA
g_{fs}	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 180\text{ mA}$	-	1.63	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 6.3\text{ A}$	-	83	135	$\text{m}\Omega$
Peak device						
$V_{(BR)DSS}$	drain-source breakdown voltage	$V_{GS} = 0\text{ V}; I_D = 2.2\text{ mA}$	65	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	$V_{DS} = 10\text{ V}; I_D = 220\text{ mA}$	1.5	1.9	2.3	V
V_{GSq}	gate-source quiescent voltage	$V_{DS} = 28\text{ V}; I_D = 660\text{ mA}$	1.6	2.1	2.4	V
I_{DSS}	drain leakage current	$V_{GS} = 0\text{ V}; V_{DS} = 28\text{ V}$	-	-	2.8	μA
I_{DSX}	drain cut-off current	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; V_{DS} = 10\text{ V}$	-	40	-	A
I_{GSS}	gate leakage current	$V_{GS} = 11\text{ V}; V_{DS} = 0\text{ V}$	-	-	28	nA
g_{fs}	forward transconductance	$V_{DS} = 10\text{ V}; I_D = 220\text{ mA}$	-	1.94	-	S
$R_{DS(on)}$	drain-source on-state resistance	$V_{GS} = V_{GS(th)} + 3.75\text{ V}; I_D = 7.7\text{ A}$	-	68	112	$\text{m}\Omega$

Table 7. RF characteristics

Test signal: 1-carrier W-CDMA; PAR = 7.2 dB at 0.01 % probability on the CCDF; 3GPP test model 1; 1 to 64 DPCH; $f_1 = 2500\text{ MHz}; f_2 = 2690\text{ MHz}$; RF performance at $V_{DS} = 28\text{ V}; I_{Dq} = 500\text{ mA}$ (main); $V_{GS(amp)peak} = 0.5\text{ V}; T_{case} = 25\text{ °C}$; unless otherwise specified; in an asymmetrical Doherty production test circuit in 2500 MHz to 2690 MHz.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	$P_{L(AV)} = 56\text{ W}$	12.8	14	-	dB
RL_{in}	input return loss	$P_{L(AV)} = 56\text{ W}$	-	-10	-6	dB
η_D	drain efficiency	$P_{L(AV)} = 56\text{ W}$	32	37	-	%
ACPR	adjacent channel power ratio	$P_{L(AV)} = 56\text{ W}$	-	-25	-20	dBc

7. Test information

7.1 Ruggedness in class-AB operation

The BLC8G27LS-240AV is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS} = 28$ V; $I_{Dq} = 500$ mA (main); $V_{GS(amp)peak} = V_{GS} - 1$ V (V_{GS} : I_{Dq} at 750 mA); $P_L = 200$ W (CW); $f = 2500$ MHz.

7.2 Impedance information

Table 8. Typical impedance of main device

Measured load-pull data of main device; $I_{Dq} = 1000$ mA; $V_{DS} = 28$ V. Typical values unless otherwise specified.

f	Z _S ^[1]	Z _L ^[1]	P _L ^[2]	η _D ^[2]	G _p ^[2]
(MHz)	(Ω)	(Ω)	(W)	(%)	(dB)
Maximum power load					
2500	2.7 – j4.1	1.0 – j4.5	197	53.5	13.1
2600	2.7 – j5.2	1.0 – j4.5	196	53.5	14.1
2700	2.9 – j4.3	1.0 – j4.5	186	54.3	15.7
Maximum drain efficiency load					
2500	2.7 – j4.1	1.7 – j3.9	159	62.6	15.2
2600	2.7 – j5.2	1.5 – j3.7	144	61.2	16.5
2700	2.9 – j4.3	1.4 – j4.1	149	58.5	17.2

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

[2] at 3 dB gain compression.

Table 9. Typical impedance of peak device

Measured load-pull data of peak device; $I_{Dq} = 1230$ mA; $V_{DS} = 28$ V. Typical values unless otherwise specified.

f	Z _S ^[1]	Z _L ^[1]	P _L ^[2]	η _D ^[2]	G _p ^[2]
(MHz)	(Ω)	(Ω)	(W)	(%)	(dB)
Maximum power load					
2500	2.5 – j5.6	2.1 – j4.9	256	53.3	13.7
2600	3.9 – j5.1	2.1 – j4.9	254	53.8	14.4
2700	3.4 – j4.2	2.6 – j5.1	240	53.3	15.9
Maximum drain efficiency load					
2500	2.5 – j5.6	2.0 – j2.9	187	62.1	16.0
2600	3.9 – j5.1	1.8 – j3.1	177	60.4	16.9
2700	3.4 – j4.2	1.8 – j3.5	174	59.5	18.1

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

[2] at 3 dB gain compression.

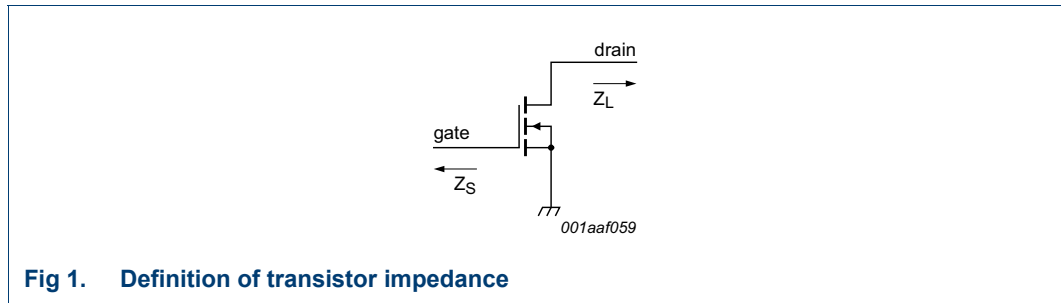
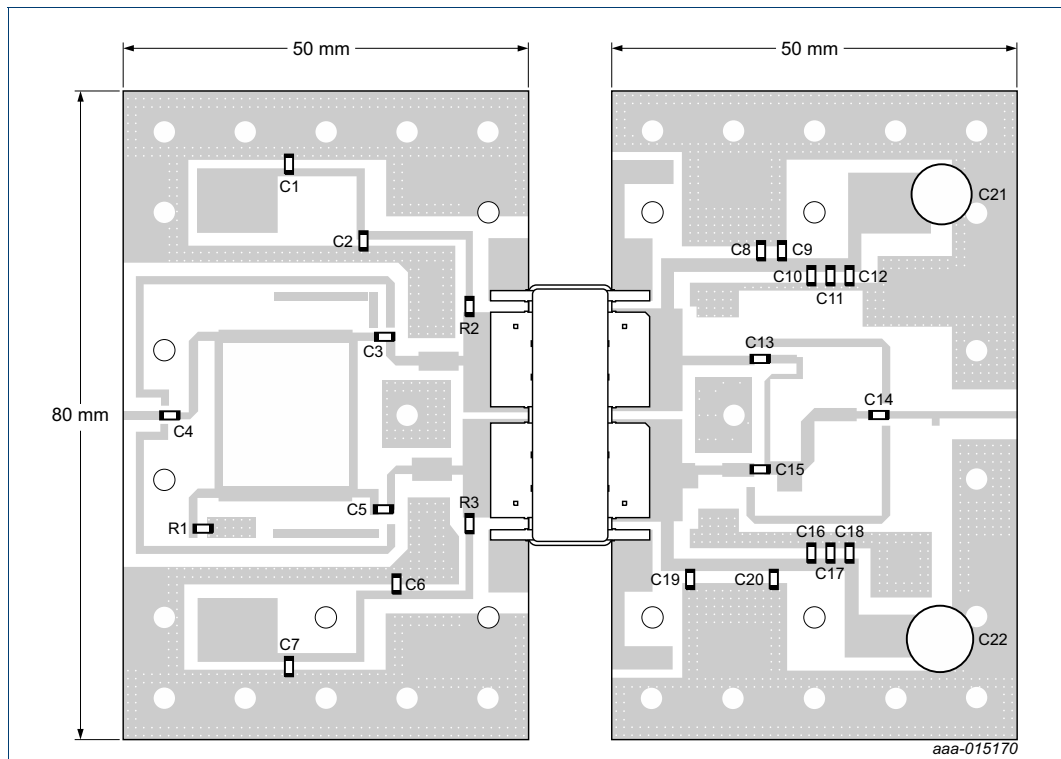


Fig 1. Definition of transistor impedance

7.3 VBW in Doherty operation

The BLC8G27LS-240AV shows 110 MHz (typical) video band-width in Doherty demo board in 2600 MHz at $V_{DS} = 28\text{ V}$; $I_{Dq} = 500\text{ mA}$ and $V_{GS(amp)peak} = 0.5\text{ V}$.

7.4 Test circuit



Printed-Circuit Board (PCB): Rogers RO4350B with a thickness of 0.508 mm.
See [Table 10](#) for a list of components.

Fig 2. Component layout

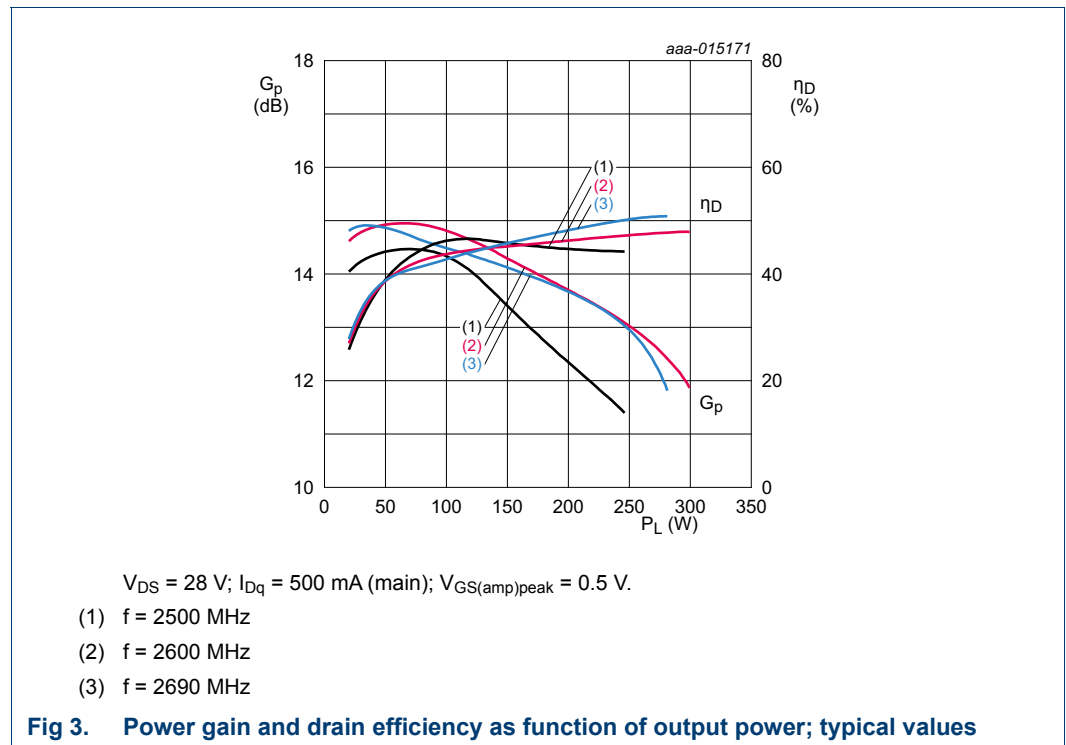
Table 10. List of components

For test circuit see [Figure 2](#).

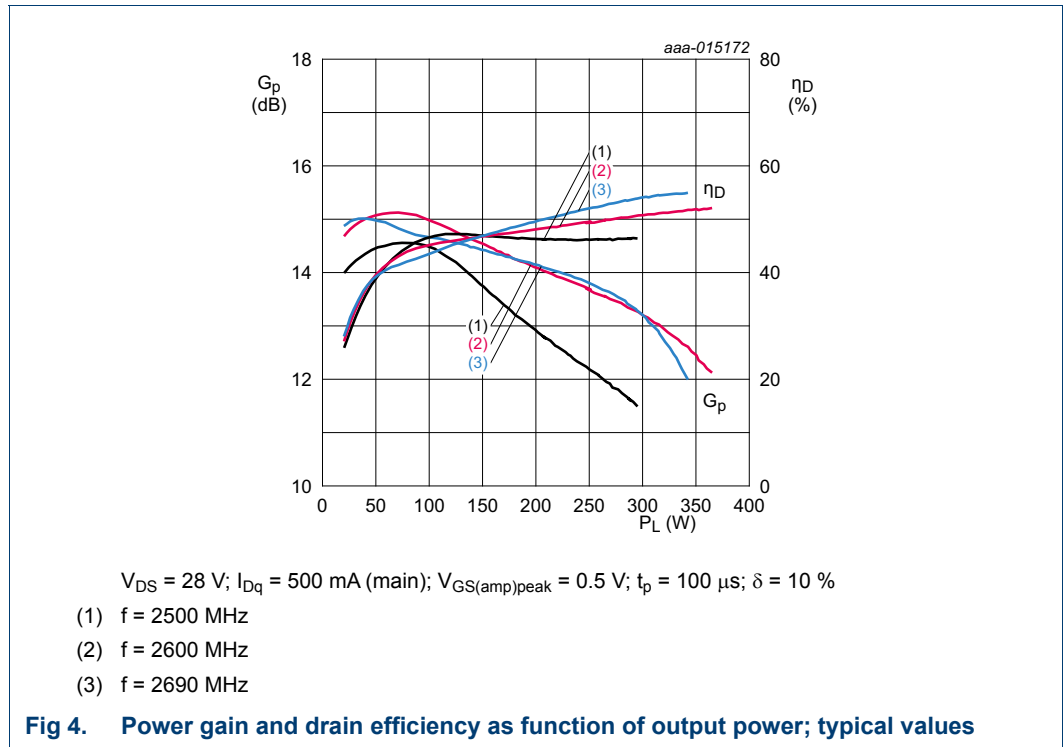
Component	Description	Value	Remarks
C1, C7	multilayer ceramic chip capacitor	0.1 μ F, 50 V	Murata
C2, C3, C4, C5, C6, C8, C9, C13, C14, C15, C19, C20	multilayer ceramic chip capacitor	22 pF	ATC 600F
C10, C11, C12, C16, C17, C18	multilayer ceramic chip capacitor	4.7 μ F, 50 V	Murata
C21, C22	electrolytic capacitor	2200 μ F, 63 V	
R1	resistor	50 Ω	
R2, R3	chip resistor	9.1 Ω	SMD 0805

7.5 Graphical data

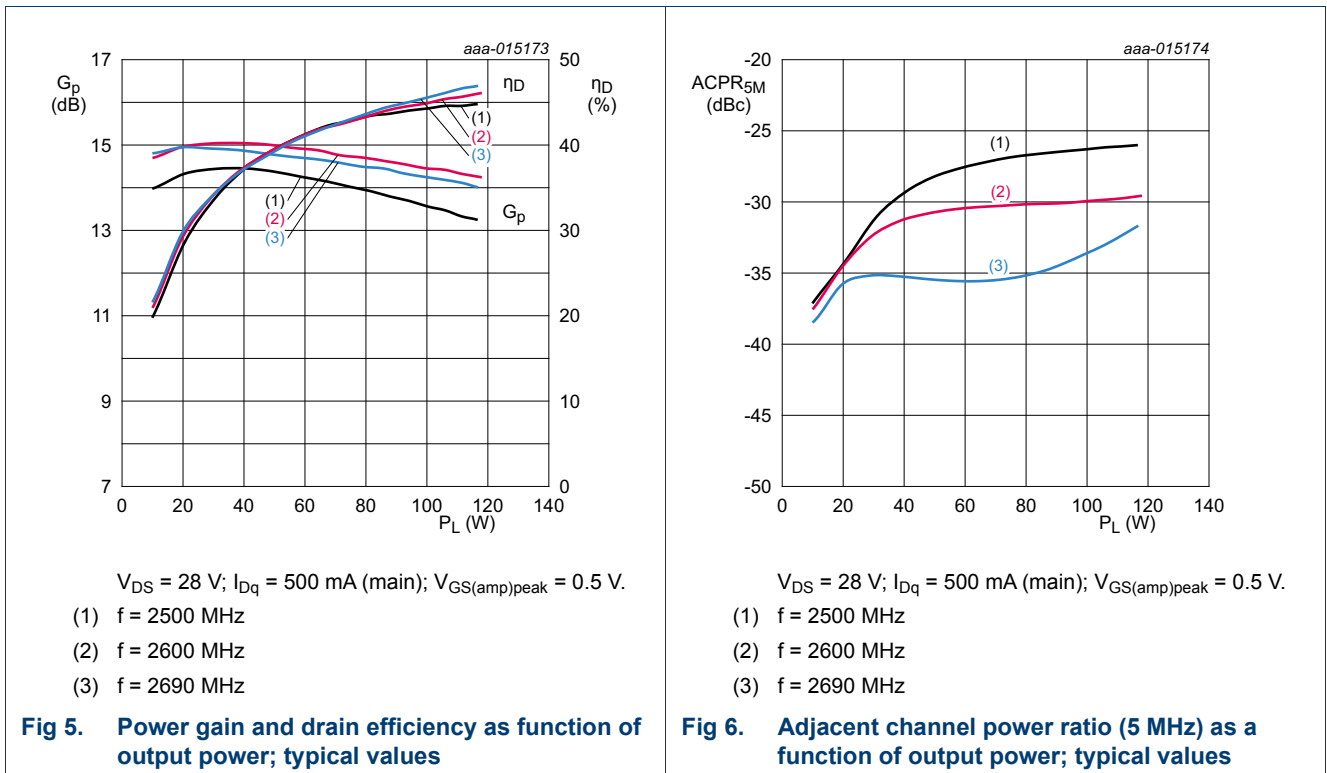
7.5.1 CW

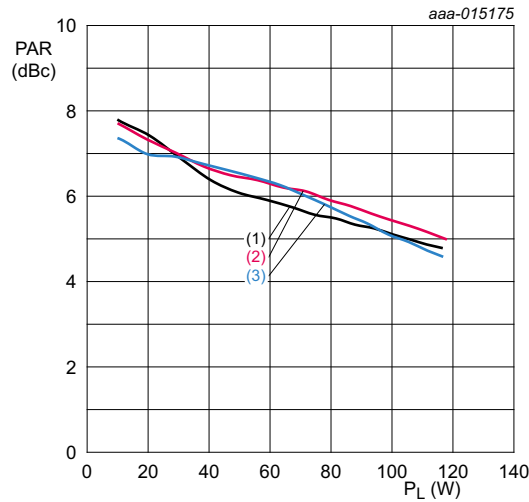


7.5.2 CW pulsed



7.5.3 1-Carrier W-CDMA



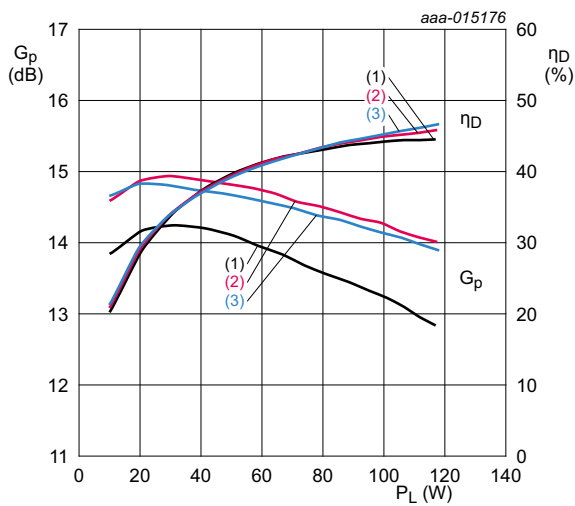


$V_{DS} = 28\text{ V}$; $I_{Dq} = 500\text{ mA}$ (main); $V_{GS(amp)peak} = 0.5\text{ V}$.

- (1) $f = 2500\text{ MHz}$
- (2) $f = 2600\text{ MHz}$
- (3) $f = 2690\text{ MHz}$

Fig 7. Peak-to-average ratio as a function of output power; typical values

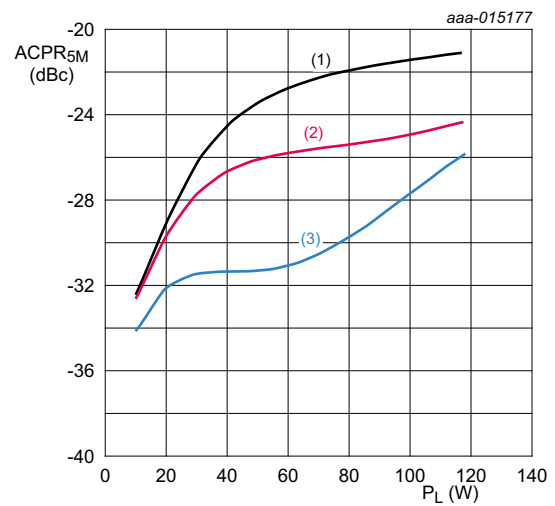
7.5.4 2-Carrier W-CDMA



$V_{DS} = 28\text{ V}$; $I_{Dq} = 500\text{ mA}$ (main); $V_{GS(amp)peak} = 0.5\text{ V}$.

- (1) $f = 2500\text{ MHz}$
- (2) $f = 2600\text{ MHz}$
- (3) $f = 2690\text{ MHz}$

Fig 8. Power gain and drain efficiency as function of output power; typical values

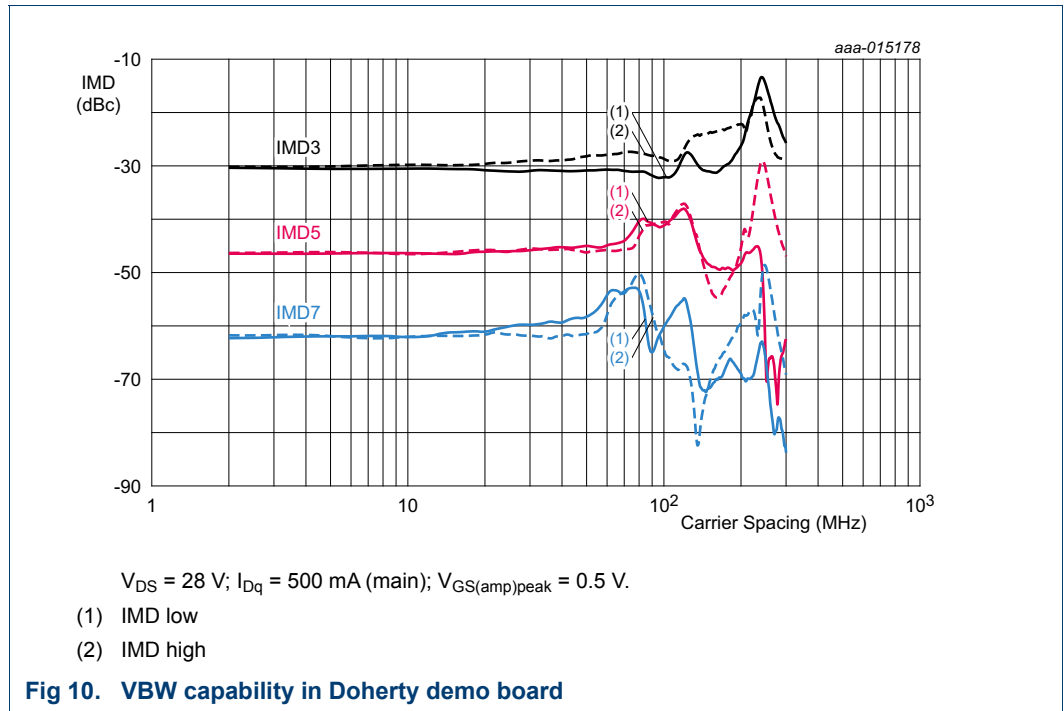


$V_{DS} = 28\text{ V}$; $I_{Dq} = 500\text{ mA}$ (main); $V_{GS(amp)peak} = 0.5\text{ V}$.

- (1) $f = 2500\text{ MHz}$
- (2) $f = 2600\text{ MHz}$
- (3) $f = 2690\text{ MHz}$

Fig 9. Adjacent channel power ratio (5 MHz) as a function of output power; typical values

7.5.5 2-Tone VBW



8. Package outline

Air cavity plastic earless flanged package; 8 leads

SOT1252-1

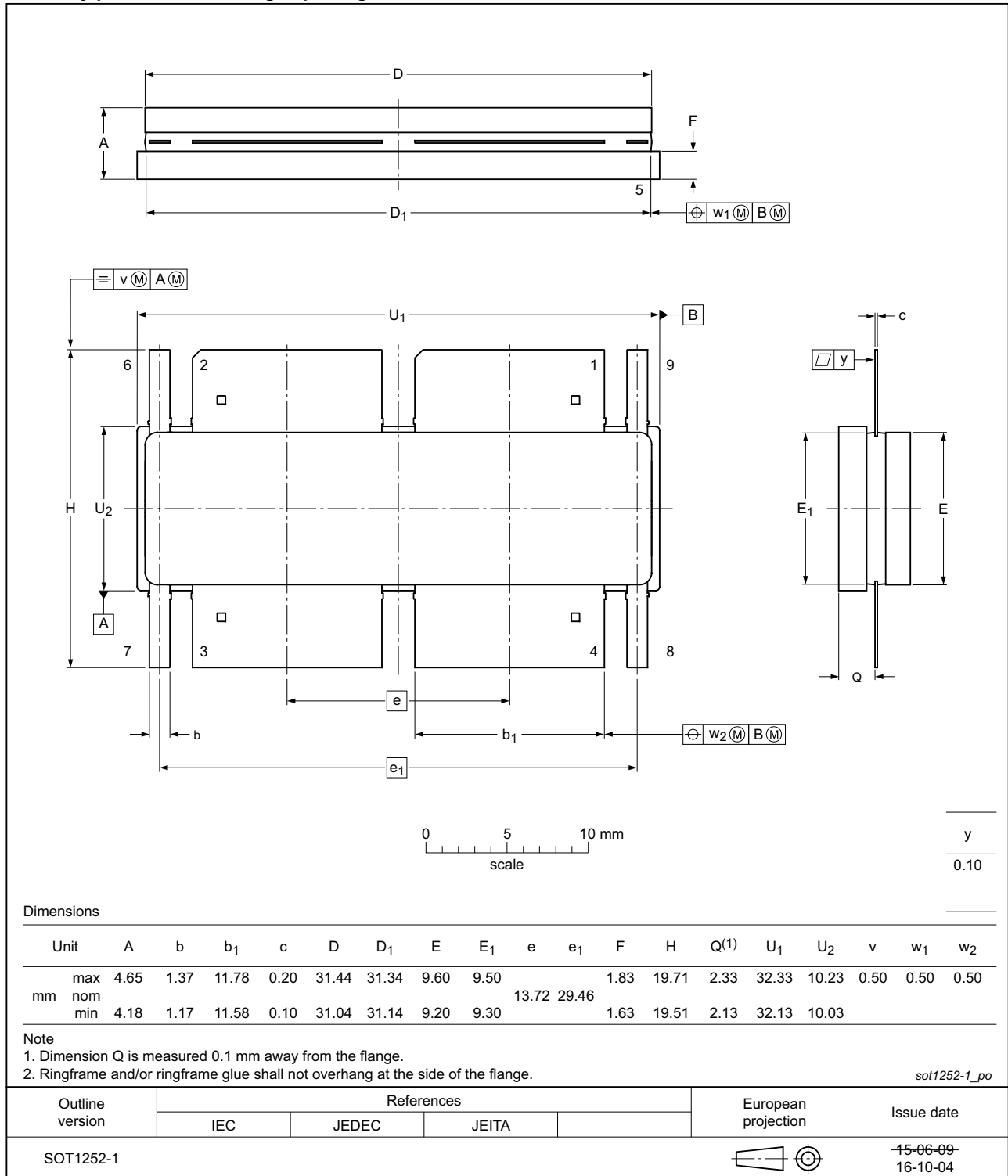


Fig 11. Package outline SOT1252-1

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.

Table 11. ESD sensitivity

ESD model	Class
Charged Device Model (CDM); According to ANSI/ESDA/JEDEC standard JS-002	C2A [1]
Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001	2 [2]

[1] CDM classification C2A is granted to any part that passes after exposure to an ESD pulse of 500 V, but fails after exposure to an ESD pulse of 750 V.

[2] HBM classification 2 is granted to any part that passes after exposure to an ESD pulse of 2000 V, but fails after exposure to an ESD pulse of 4000 V.

10. Abbreviations

Table 12. 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 13. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLC8G27LS-240AV v.5	20161202	Product data sheet	-	BLC8G27LS-240AV v.4
Modifications:	<ul style="list-style-type: none">• Figure 11 on page 10: updated package outline drawing SOT1252-1• Section 9 on page 11: updated Handling information			
BLC8G27LS-240AV v.4	20150901	Product data sheet	-	BLC8G27LS-240AV v.3
BLC8G27LS-240AV v.3	20150728	Product data sheet	-	BLC8G27LS-240AV v.2
BLC8G27LS-240AV v.2	20150603	Product data sheet	-	BLC8G27LS-240AV v.1
BLC8G27LS-240AV v.1	20131104	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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