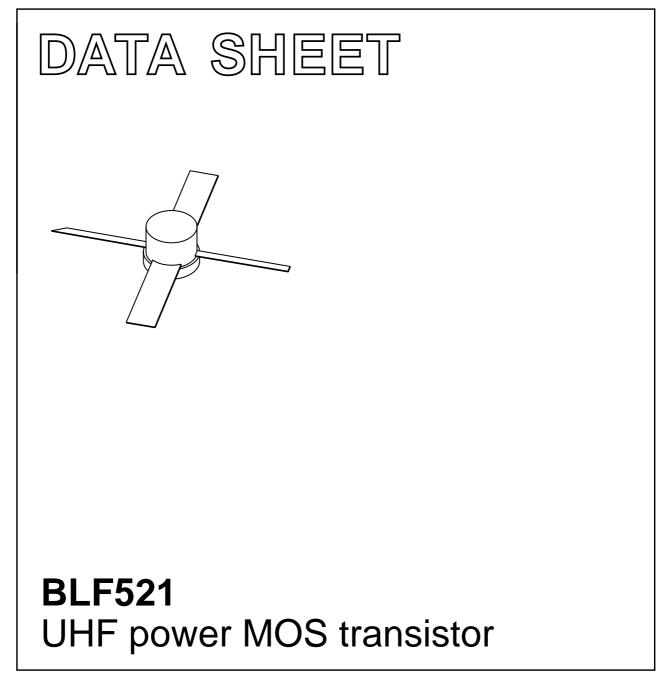
DISCRETE SEMICONDUCTORS



Product specification Supersedes data of 1998 Jan 07 2003 Sep 02



BLF521

FEATURES

- High power gain
- Easy power control
- Gold metallization
- · Good thermal stability
- Withstands full load mismatch
- Designed for broadband operation.

DESCRIPTION

Silicon N-channel enhancement mode vertical D-MOS transistor designed for communications transmitter applications in the UHF frequency range.

The transistor is encapsulated in a 4-lead, SOT172D studless package, with a ceramic cap. All leads are isolated from the mounting base.

PINNING - SOT172D

PIN	DESCRIPTION
1	source
2	gate
3	drain
4	source

PIN CONFIGURATION

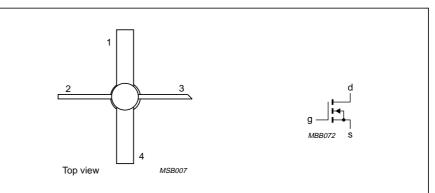


Fig.1 Simplified outline and symbol.

CAUTION

This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A, and SNW-FQ-302B.

WARNING

Product and environmental safety - toxic materials

This product contains beryllium oxide. The product is entirely safe provided that the BeO disc is not damaged. All persons who handle, use or dispose of this product should be aware of its nature and of the necessary safety precautions. After use, dispose of as chemical or special waste according to the regulations applying at the location of the user. It must never be thrown out with the general or domestic waste.

QUICK REFERENCE DATA

RF performance at T_{amb} = 25 °C in a common source test circuit.

MODE OF OPERATION	f	V _{DS}	P _L	G _p	η _D
	(MHz)	(V)	(W)	(dB)	(%)
CW, class-B	500	12.5	2	>10	>50

BLF521

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 60134).

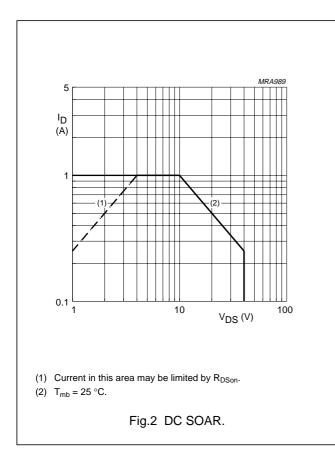
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V _{DS}	drain-source voltage		-	40	V
V _{GS}	gate-source voltage		-	±20	V
I _D	drain current (DC)		-	1	A
P _{tot}	total power dissipation	$T_{mb} \le 25 \ ^{\circ}C$	-	10	W
T _{stg}	storage temperature		-65	150	°C
Tj	junction temperature		-	200	°C

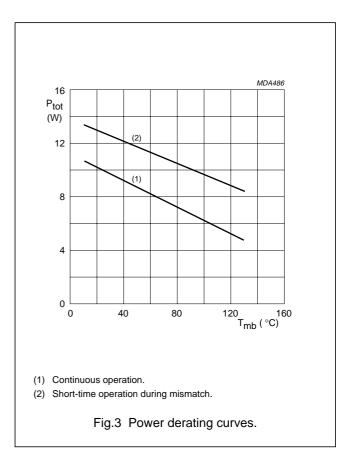
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
R _{th j-mb}	thermal resistance from junction to mounting base	17.5	K/W
R _{th j-a}	thermal resistance from junction to ambient; note1	75	K/W

Note

1. Mounted on printed-circuit board; see Fig.12.





Product specification

UHF power MOS transistor

BLF521

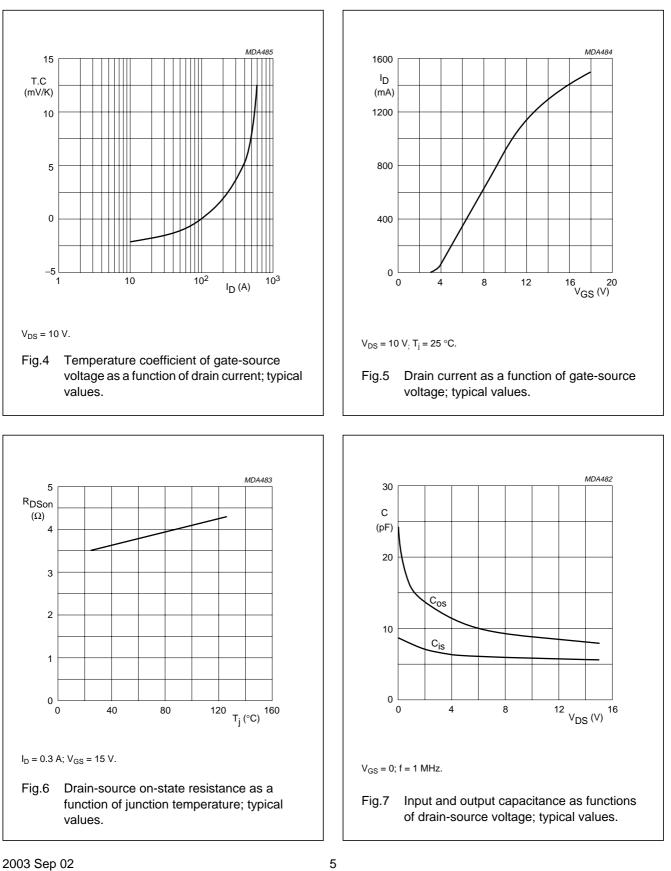
CHARACTERISTICS

 $T_i = 25 \ ^{\circ}C$ unless otherwise specified.

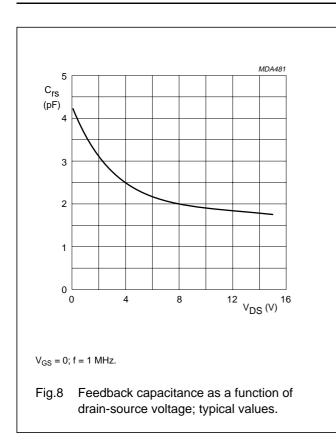
SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V _{(BR)DSS}	drain-source breakdown voltage	$V_{GS} = 0; I_D = 3 \text{ mA}$	40	-	-	V
I _{DSS}	drain-source leakage current	$V_{GS} = 0; V_{DS} = 12.5 V$	-	-	10	μA
I _{GSS}	gate-source leakage current	$V_{GS} = \pm 20 \text{ V}; V_{DS} = 0$	-	-	1	μA
V _{GSth}	gate-source threshold voltage	I _D = 3 mA; V _{DS} = 10 V	2	-	4.5	V
g _{fs}	forward transconductance	I _D = 0.3 A; V _{DS} = 10 V	80	135	-	mS
R _{DSon}	drain-source on-state resistance	I _D = 0.3 A; V _{GS} = 15 V	-	3.5	4	Ω
I _{DSX}	on-state drain current	$V_{GS} = 15 \text{ V}; V_{DS} = 10 \text{ V}$	-	1.3	-	A
C _{is}	input capacitance	V _{GS} = 0; V _{DS} = 12.5 V; f = 1 MHz	-	5.3	-	pF
C _{os}	output capacitance	V _{GS} = 0; V _{DS} = 12.5 V; f = 1 MHz	-	7.8	-	pF
C _{rs}	feedback capacitance	$V_{GS} = 0; V_{DS} = 12.5 V; f = 1 MHz$	-	1.8	-	pF

V_{GS} group indicator

GROUP	LIM (\	ITS /)	GROUP	LIMITS (V)		
	MIN.	MAX.		MIN.	MAX.	
A	2.0	2.1	0	3.3	3.4	
В	2.1	2.2	Р	3.4	3.5	
С	2.2	2.3	Q	3.5	3.6	
D	2.3	2.4	R	3.6	3.7	
E	2.4	2.5	S	3.7	3.8	
F	2.5	2.6	Т	3.8	3.9	
G	2.6	2.7	U	3.9	4.0	
Н	2.7	2.8	V	4.0	4.1	
J	2.8	2.9	W	4.1	4.2	
K	2.9	3.0	Х	4.2	4.3	
L	3.0	3.1	Y	4.3	4.4	
М	3.1	3.2	Z	4.4	4.5	
N	3.2	3.3				



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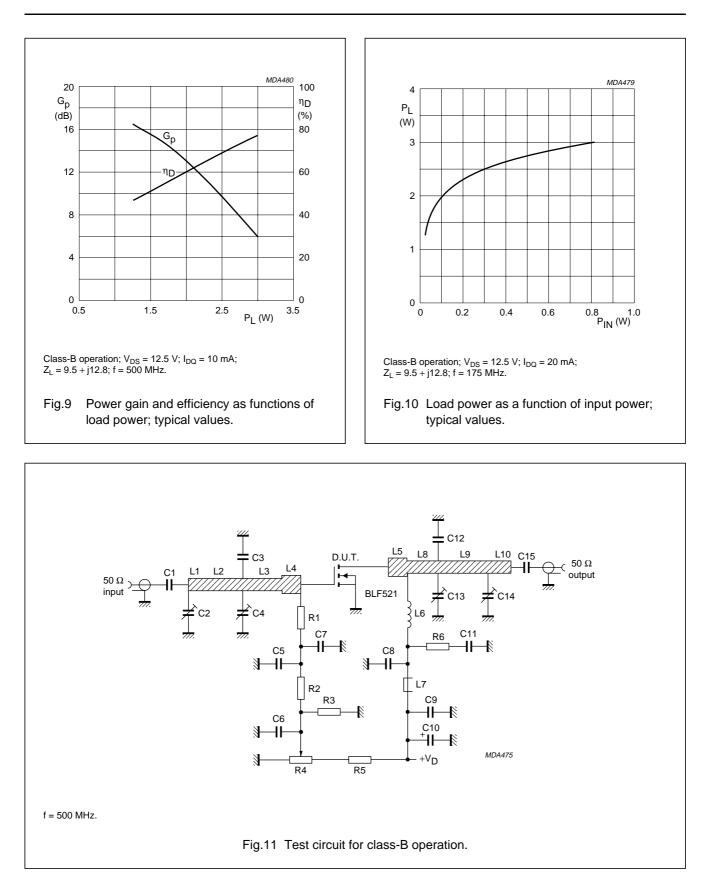
APPLICATION INFORMATION FOR CLASS-B OPERATION

 T_{amb} = 25 °C; R_{GS} = 274 Ω , unless otherwise specified. RF performance in a common source class-B test circuit.

MODE OF OPERATION	f	V _{DS}	I _{DQ}	P _L	G _p	η _D
	(MHz)	(V)	(mA)	(W)	(dB)	(%)
CW, class-B	500	12.5	10	2	> 10 typ. 13	> 50 typ. 60

Ruggedness in class-B operation

The BLF521 is capable of withstanding a load mismatch corresponding to VSWR = 50:1 through all phases under the following conditions: $V_{DS} = 15.5$ V; f = 500 MHz at rated output power.



BLF521

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C5, C8, C15	multilayer ceramic chip capacitor; note 1	390 pF, 500 V		
C2, C13	film dielectric trimmer	2 to 9 pF		2222 809 09002
C3	multilayer ceramic chip capacitor; note 2	5.6 pF, 500 V		
C4	film dielectric trimmer	2 to 18 pF		2222 809 09003
C6, C11	multilayer ceramic chip capacitor	$2 \times 100 \text{ nF}$ in parallel, 50 V		2222 852 47104
C7, C9	multilayer ceramic chip capacitor	100 nF, 50 V		2222 852 47104
C10	electrolytic capacitor	10 μF, 63 V		2222 030 38109
C12	multilayer ceramic chip capacitor; note 2	9.1 pF, 50 V		
C14	film dielectric trimmer	1.4 to 5.5 pF		2222 809 09001
L1	stripline; note 3	83 Ω	$20 \times 2 \text{ mm}$	
L2	stripline; note 3	83 Ω	21 × 2 mm	
L3	stripline; note 3	83 Ω	19 × 2 mm	
L4, L5	stripline; note 3	67 Ω	$12 \times 3 \text{ mm}$	
L6	5 turns enamelled 0.5 mm copper wire	62 nH	length 3.75 mm int. dia. 3 mm leads 2×4 mm	
L7	grade 3B Ferroxcube RF choke			4312 020 36642
L8	stripline; note 3	83 Ω	$18.6 \times 2 \text{ mm}$	
L9	stripline; note 3	83 Ω	$31.6 \times 2 \text{ mm}$	
L10	stripline; note 3	83 Ω	$2 \times 2 \text{ mm}$	
R1	0.4 W metal film resistor	274 Ω		2322 151 72741
R2	0.4 W metal film resistor	1.96 kΩ		2322 151 71962
R3	0.4 W metal film resistor	1 MΩ		2322 151 71005
R4	cermet potentiometer	5 kΩ		
R5	0.4 W metal film resistor	7.5 kΩ		2322 151 77502
R6	1 W metal film resistor	10 Ω		2322 153 51009

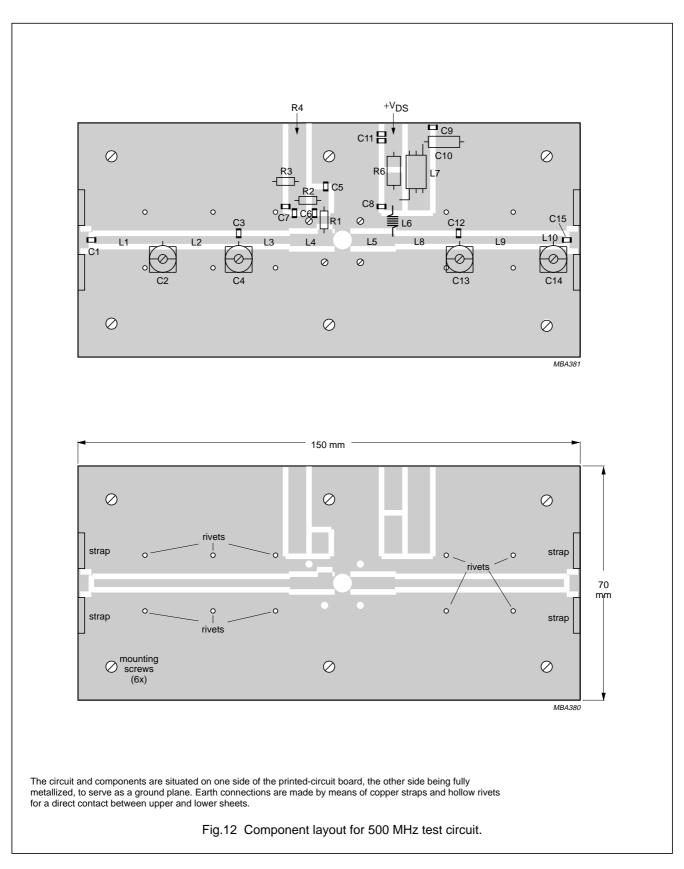
List of components class-AB test circuit (see Fig.12)

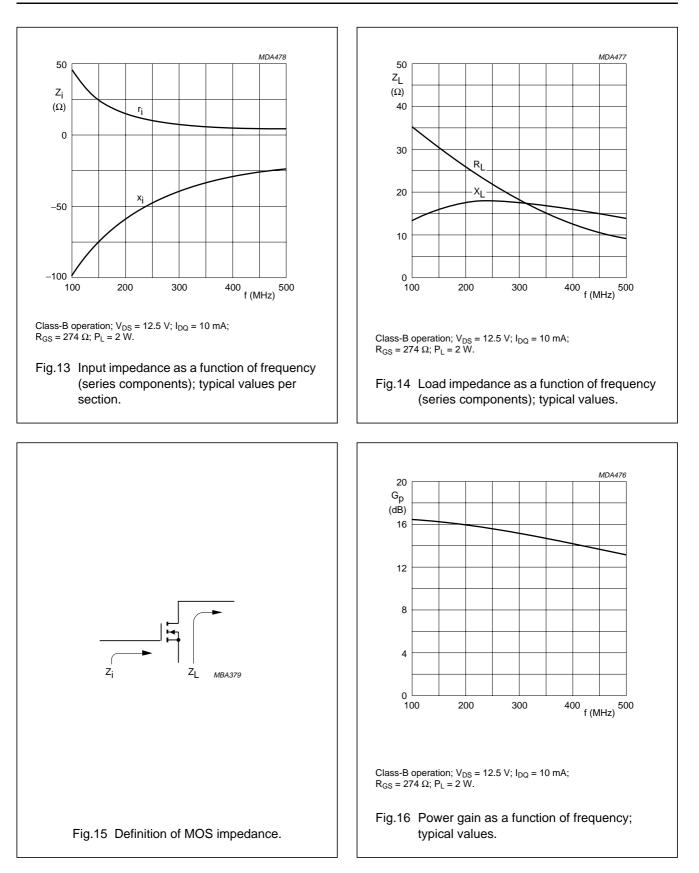
Notes

1. American Technical Ceramics (ATC) capacitor, type 100B or other capacitor of the same quality.

2. American Technical Ceramics (ATC) capacitor, type 100A or other capacitor of the same quality.

3. The striplines are on a double copper-clad printed-circuit board, with PTFE fibre-glass dielectric (ϵ_r = 2.2), thickness 1.6 mm.





BLF521

BLF521 scattering parameters

 V_{DS} = 12.5 V; I_{D} = 10 mA.; note 1

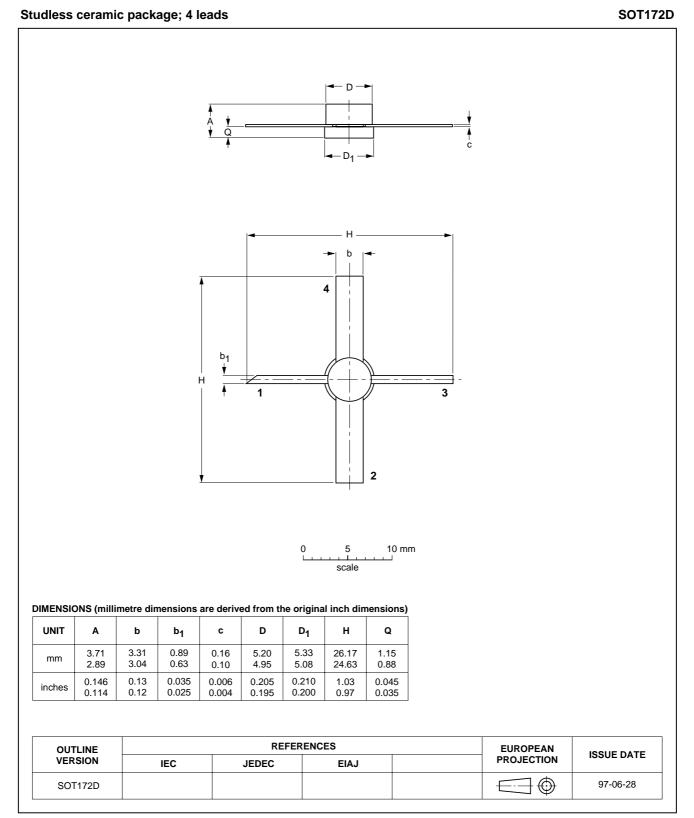
f (MHz)		S ₁₁	S	21	s ₁	2	\$ ₂₂	
	s ₁₁	$\angle \Phi$	s ₂₁	$\angle \Phi$	s ₁₂	$\angle \Phi$	s ₂₂	$\angle \Phi$
5	1.00	-1.6	4.51	178.5	0.01	88.5	0.98	-2.0
10	1.00	-3.2	4.51	177.0	0.01	87.2	0.98	-4.0
20	1.00	-6.4	4.50	173.9	0.02	84.5	0.98	-8.0
30	1.00	-9.6	4.48	170.9	0.03	81.7	0.98	-12.0
40	0.99	-12.8	4.45	167.9	0.04	79.0	0.97	-16.0
50	0.99	-16.0	4.43	164.9	0.05	76.2	0.97	-19.9
60	0.98	-19.1	4.39	161.9	0.06	73.5	0.97	-23.8
70	0.97	-22.1	4.34	158.9	0.07	70.9	0.96	-27.6
80	0.97	-25.1	4.28	156.1	0.08	68.3	0.96	-31.3
90	0.96	-28.0	4.22	153.3	0.08	65.8	0.95	-34.9
100	0.95	-30.9	4.16	150.5	0.09	63.3	0.94	-38.5
125	0.92	-37.9	4.00	144.0	0.11	57.5	0.93	-47.1
150	0.90	-44.3	3.83	137.6	0.13	51.8	0.91	-55.2
175	0.87	-50.4	3.64	131.8	0.14	46.7	0.89	-62.7
200	0.85	-56.0	3.46	126.5	0.15	42.2	0.88	-69.6
250	0.80	-66.2	3.12	116.4	0.17	33.4	0.85	-81.9
300	0.77	-75.1	2.81	108.0	0.18	26.4	0.82	-92.3
350	0.74	-82.9	2.54	100.1	0.19	19.8	0.81	-101.3
400	0.72	-89.7	2.31	93.5	0.19	14.4	0.79	-108.9
450	0.70	-95.9	2.10	87.1	0.19	9.5	0.79	-115.5
500	0.69	-101.5	1.93	81.4	0.19	4.9	0.78	-121.2
600	0.69	–111.3	1.64	71.2	0.19	-2.6	0.78	-130.7
700	0.69	-119.9	1.41	62.2	0.18	-8.7	0.77	-138.5
800	0.69	-127.9	1.23	54.3	0.17	-13.6	0.78	-145.2
900	0.70	-135.1	1.08	47.3	0.15	-17.7	0.78	-151.4
1000	0.72	-142.0	0.97	40.9	0.14	-21.1	0.79	-156.9

Note

1. For more extensive s-parameters see internet:

http://www.semiconductors.philips.com/markets/communications/wirelesscommunication/broadcast

PACKAGE OUTLINE



BLF521

Product specification

DATA SHEET STATUS

LEVEL	DATA SHEET STATUS ⁽¹⁾	PRODUCT STATUS ⁽²⁾⁽³⁾	DEFINITION
I	Objective data	Development	This data sheet contains data from the objective specification for product development. Philips Semiconductors reserves the right to change the specification in any manner without notice.
11	Preliminary data	Qualification	This data sheet contains data from the preliminary specification. Supplementary data will be published at a later date. Philips Semiconductors reserves the right to change the specification without notice, in order to improve the design and supply the best possible product.
	Product data	Production	This data sheet contains data from the product specification. Philips Semiconductors reserves the right to make changes at any time in order to improve the design, manufacturing and supply. Relevant changes will be communicated via a Customer Product/Process Change Notification (CPCN).

Notes

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- 2. The product status of the device(s) described in this data sheet may have changed since this data sheet was published. The latest information is available on the Internet at URL http://www.semiconductors.philips.com.
- 3. For data sheets describing multiple type numbers, the highest-level product status determines the data sheet status.

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

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