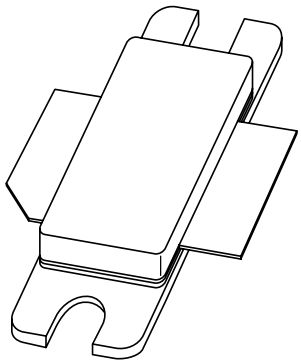
DATA SHEET



BLF2047L/90
UHF power LDMOS transistor

Product specification
Supersedes data of 2000 Feb 17

2000 Mar 06

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UHF power LDMOS transistor BLF2047L/90

FEATURES

- High power gain
- Easy power control
- Excellent ruggedness
- Source on underside eliminates DC isolators, reducing common mode inductance
- Designed for broadband operation (1.8 to 2.0 GHz)
- Internal input and output matching for high gain and efficiency.

APPLICATIONS

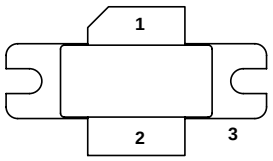
- Common source class-AB operation for PCN and PCS applications in the 1800 to 2000 MHz frequency range.

DESCRIPTION

Silicon N-channel enhancement mode lateral D-MOS transistors encapsulated in a 2-lead SOT502A flange package with a ceramic cap. The common source is connected to the mounting flange.

PINNING

PIN	DESCRIPTION
1	drain
2	gate
3	source, connected to flange



Top view MBK394

Fig.1 Simplified outline SOT502A.

QUICK REFERENCE DATA

RF performance at T_h = 25 °C in a common source test circuit.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	P_L (W)	G_p (dB)	η_D (%)	d_{im} (dBc)
Two-tone, class-AB	f_1 = 2000; f_2 = 2000.1	26	90 (PEP)	>10.5	>30	≤–25

LIMITING VALUES

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

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage	–	65	V
V_{GS}	gate-source voltage	–	±15	V
I_D	DC drain current	–	12	A
T_{stg}	storage temperature	–65	+150	°C
T_j	junction temperature	–	200	°C

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.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}h}$	thermal resistance from junction to heatsink	T_h = 25 °C; P_{tot} = 92 W; note 1	0.81	K/W

Note

1. Determined under specified RF operating conditions, based on maximum junction temperature.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0; I_D = 2.1 mA	65	–	–	V
V_{GSth}	gate-source threshold voltage	V_{DS} = 10 V; I_D = 210 mA	1.5	–	3.5	V
I_{DSS}	drain-source leakage current	V_{GS} = 0; V_{DS} = 26 V	–	–	15	µA
I_{DSX}	on-state drain current	V_{GS} =V_{GSth} + 9 V; V_{DS} = 10 V	27	–	–	A
I_{GSS}	gate leakage current	V_{GS} = ±15 V; V_{DS} = 0	–	–	38	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 7.5 A	–	6.0	–	S
R_{DSon}	drain-source on-state resistance	V_{GS} = V_{GSth} + 9 V; I_D = 7.5 A	–	0.11	–	Ω
C_{rss}	feedback capacitance	V_{GS} = 0; V_{DS} = 26 V; f = 1 MHz; note 1	–	5.1	–	pF

Note

1. The value of capacitance is that of the die only.

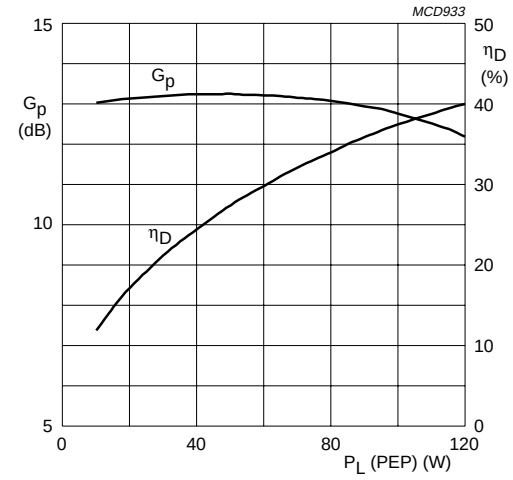
APPLICATION INFORMATION

RF performance in a common source class-AB circuit. T_h = 25 °C; $R_{th\ j\text{-}h}$ = 0.81 K/W; unless otherwise specified.

MODE OF OPERATION	f (MHz)	V_{DS} (V)	I_{DQ} (mA)	P_L (W)	G_p (dB)	η_D (%)	d_{im} (dBc)
Two-tone, class-AB	f_1 = 2000; f_2 = 2000.1	26	525	90 (PEP)	>10.5	>30	≤–25

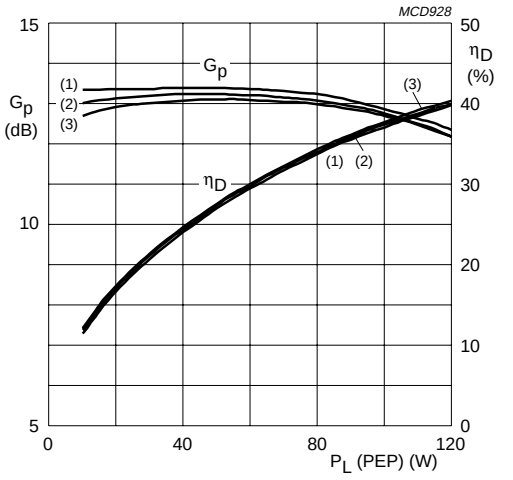
Ruggedness in class-AB operation

The BLF2047L/90 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: V_{DS} = 26 V; I_{DQ} = 525 mA; P_L = 90 W; f = 2000 MHz (single tone).



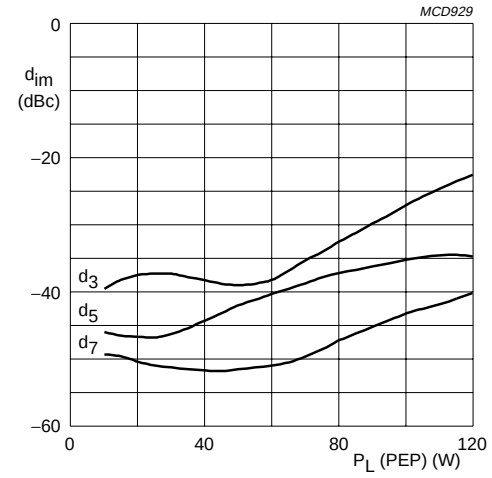
V_{DS} = 26 V; I_{DQ} = 525 mA; $T_h \leq 25$ °C;
f_1 = 2000 MHz; f_2 = 2000.1 MHz.

Fig.2 Power gain and drain efficiency as functions of peak envelope load power; typical values.



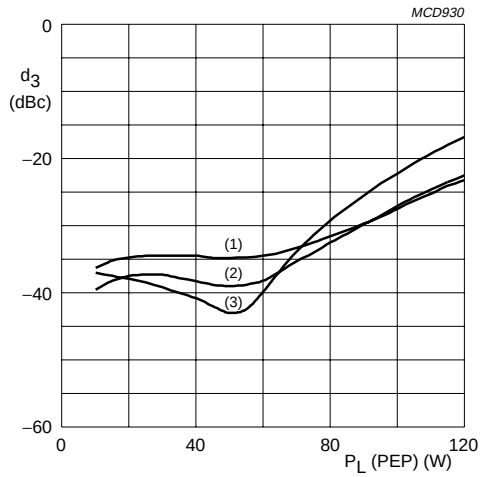
V_{DS} = 26 V; $T_h \leq 25$ °C; f_1 = 2000 MHz; f_2 = 2000.1 MHz.
(1) I_{DQ} = 650 mA.
(2) I_{DQ} = 525 mA.
(3) I_{DQ} = 400 mA.

Fig.3 Power gain and drain efficiency as functions of peak envelope load power; typical values.



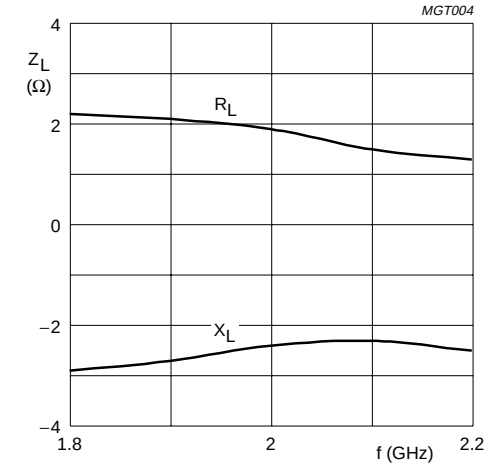
V_{DS} = 26 V; I_{DQ} = 525 mA; $T_h \leq 25$ °C; f_1 = 2000 MHz; f_2 = 2000.1 MHz.

Fig.4 Intermodulation distortion products as functions of peak envelope load power; typical values.



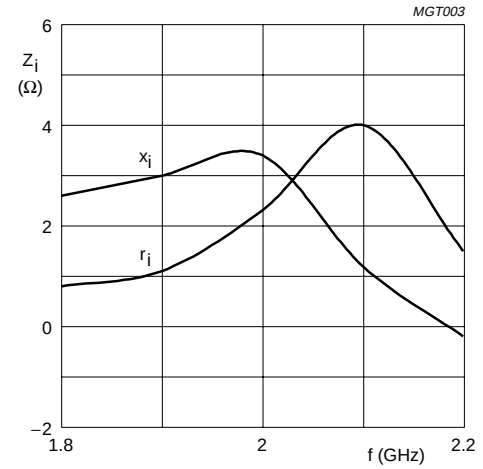
V_{DS} = 26 V; $T_h \leq 25$ °C; f_1 = 2000 MHz; f_2 = 2000.1 MHz.
(1) I_{DQ} = 400 mA.
(2) I_{DQ} = 525 mA.
(3) I_{DQ} = 650 mA.

Fig.5 Third-order intermodulation distortion as a function of peak envelope load power; typical values.



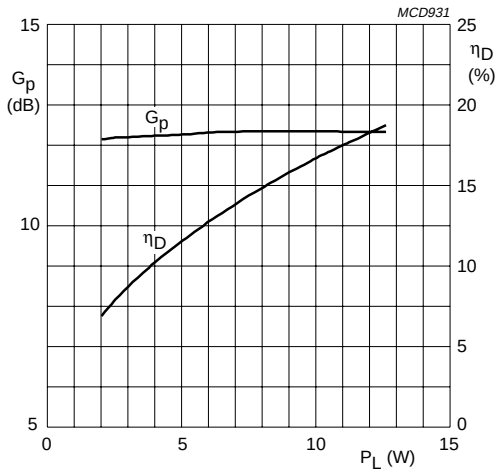
V_{DS} = 26 V; I_D = 525 mA; P_L = 90 W; $T_h \leq 25$ °C.

Fig.6 Load impedance as a function of frequency (series components); typical values.



V_{DS} = 26 V; I_D = 525 mA; P_L = 90 W; $T_h \leq 25$ °C.

Fig.7 Input impedance as a function of frequency (series components); typical values.

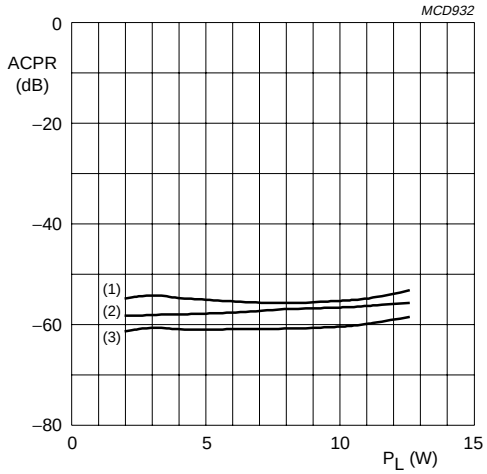


V_{DS} = 26 V; I_{DQ} = 465 mA; $T_h \leq 25$ °C; f = 1960 MHz; CDMA mode.

CDMA conditions

CHANNEL	WALSH CODE
Pilot	0
Sync	32
Paging	1
Traffic	8 to 13

Fig.8 Power gain and drain efficiency as functions of average load power; typical values.



V_{DS} = 26 V; I_{DQ} = 465 mA; $T_h \leq 25$ °C; f = 1960 MHz; CDMA mode.
(1) Channel spacing/Bandwidth: 2.25 MHz/1 MHz.
(2) Channel spacing/Bandwidth: 1.25 MHz/12.5 kHz.
(3) Channel spacing/Bandwidth: 885 kHz/30 kHz.

CDMA conditions

CHANNEL	WALSH CODE
Pilot	0
Sync	32
Paging	1
Traffic	8 to 13

Fig.9 Adjacent channel power reduction as a function of average load power; typical values.

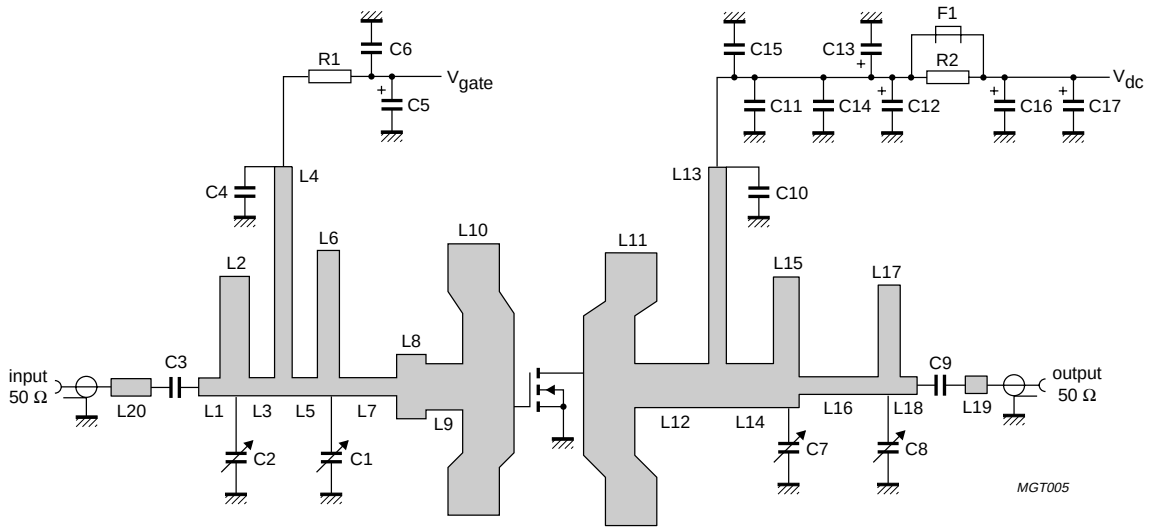


Fig.10 2 GHz class-AB test circuit.

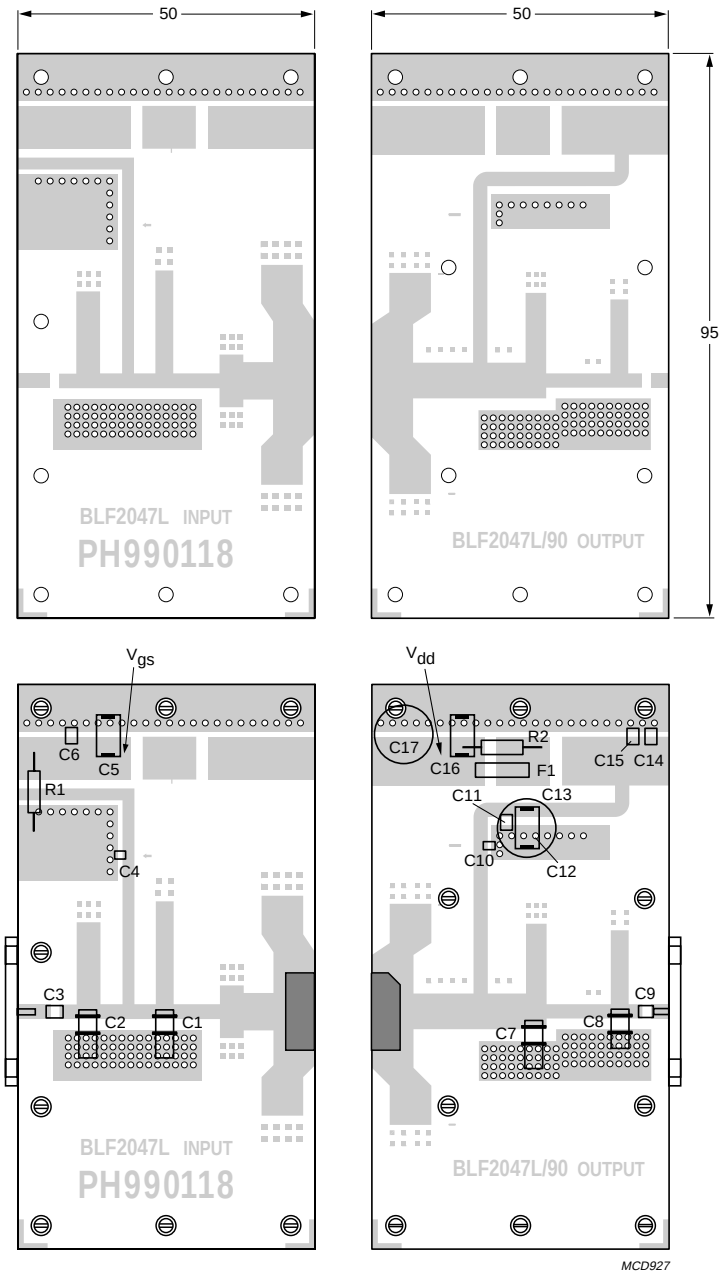
List of components

See Figs 10 and 11.

COMPONENT	DESCRIPTION	VALUE	DIMENSIONS	CATALOGUE NO.
C1, C2, C7, C8	Tekelec variable capacitor; type 37271	0.6 to 4.5 pF		
C3, C9	multilayer ceramic chip capacitor; note 1	12 pF		
C4, C10	multilayer ceramic chip capacitor; note 2	12 pF		
C5, C12, C16	electrolytic capacitor	4.5 μF; 50 V		
C6, C11, C15	multilayer ceramic chip capacitor; note 1	1 nF		
C13, C17	electrolytic capacitor	100 μF; 63 V		2222 037 58101
C14	multilayer ceramic chip capacitor	100 nF		2222 581 16641
F1	Ferroxcube chip-bead 8DS3/3/8/9-4S2			4330 030 36301
L1	stripline; note 3	50 Ω	2.9 × 2.4 mm	
L2		10.8 Ω	4 × 16.3 mm	
L3		50 Ω	3.7 × 2.4 mm	
L4		6 Ω	2 × 30.8 mm	
L5		50 Ω	3.6 × 2.4 mm	
L6		9 Ω	3 × 19.9 mm	
L7		50 Ω	7.8 × 2.4 mm	
L8		18.5 Ω	4 × 8.8 mm	
L9		24.4 Ω	5 × 6.3 mm	
L10		5.1 Ω	7 × 37 mm	
L11		5.1 Ω	7 × 40.9 mm	
L12		25.4 Ω	10.1 × 6 mm	
L13		5.7 Ω	2.4 × 32.8 mm	
L14		25.4 Ω	6.4 × 6 mm	
L15		10 Ω	3.5 × 20.7 mm	
L16		50 Ω	10.8 × 2.4 mm	
L17		11.8 Ω	3 × 7.9 mm	
L18		50 Ω	2.3 × 2.4 mm	
L19		50 Ω	3 × 2.4 mm	
L20		50 Ω	5.5 × 2.4 mm	
R1, R2	metal film resistor	10 Ω, 0.6 W		2322 156 11009

Notes

1. American Technical Ceramics type 100B or capacitor of same quality.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. The striplines are on a double copper-clad printed-circuit board with Teflon dielectric (ε_r = 2.2); thickness 0.79 mm.



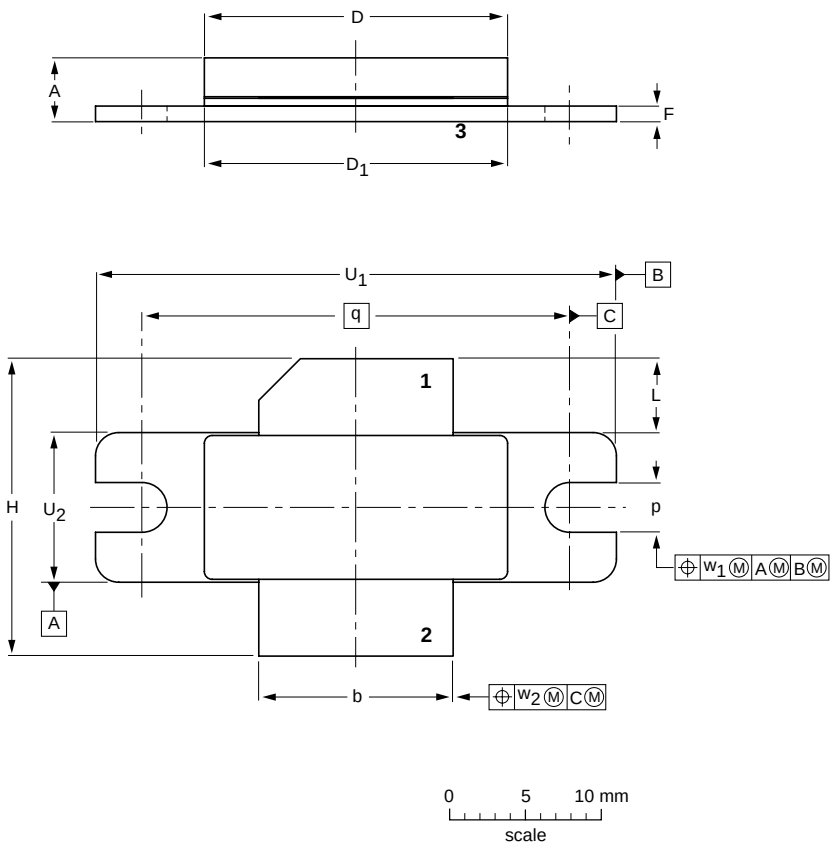
Dimensions in mm.

The components are situated on one side of the copper-clad printed-circuit board with Teflon dielectric (ε_r = 2.2), thickness 0.79 mm. The other side is unetched and serves as a ground plane.

Fig.11 Component layout for 2 GHz class-AB test circuit.

PACKAGE OUTLINE

Flanged LDMOST ceramic package; 2 mounting holes; 2 leads **SOT502A**



DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)

UNIT	A	b	c	D	D_1	E	E_1	F	H	L	p	Q	q	U_1	U_2	w_1	w_2
mm	4.72 3.99	12.83 12.57	0.15 0.08	20.02 19.61	19.96 19.66	9.50 9.30	9.53 9.25	1.14 0.89	19.94 18.92	5.33 4.32	3.38 3.12	1.70 1.45	27.94	34.16 33.91	9.91 9.65	0.25	0.51
inches	0.186 0.157	0.505 0.495	0.006 0.003	0.788 0.772	0.786 0.774	0.374 0.366	0.375 0.364	0.045 0.035	0.785 0.745	0.210 0.170	0.133 0.123	0.067 0.057	1.100	1.345 1.335	0.390 0.380	0.01	0.02

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT502A						~~99-10-13~~ 99-12-28

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
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.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

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