BLP2425M10S250P

Power LDMOS transistor

Rev. 1 — 26 March 2020

AMPLEON

Product data sheet

1. Product profile

1.1 General description

250 W LDMOS-based power transistor suitable for use in a variety of commercial and consumer cooking, industrial, scientific and medical applications at frequencies from 2400 MHz to 2500 MHz.

The BLP2425M10S250P is designed for high-power CW applications and is assembled in a high performance plastic package.

Table 1. Typical performance

RF performance at V_{DS} = 32 V; I_{Dq} = 100 mA; T_{case} = 25 °C in a class-AB application circuit.

Test signal	f	V_{DS}	$P_{L(AV)}$	G_p	η_D
	(MHz)	(V)	(W)	(dB)	(%)
CW	2450	32	250	15	66.5
CW pulsed [1]	2450	32	250	15	67.5

[1] t_p = 100 μs; δ = 10 %

1.2 Features and benefits

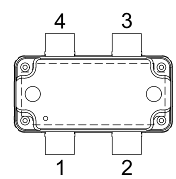
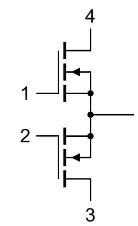
- High efficiency
- Excellent ruggedness
- Integrated ESD protection
- Designed for broadband operation (2400 MHz to 2500 MHz)
- Internally input and output matched
- Thermally enhanced low cost plastic package
- For RoHS compliance see the product details on the Ampleon website

1.3 Applications

- RF power amplifiers for CW applications in the 2400 MHz to 2500 MHz frequency range such as commercial and consumer cooking, industrial, scientific and medical applications

2. Pinning information

Table 2. Pinning

Pin	Description	Simplified outline	Graphic symbol
1	gate1		 amp01358
2	gate2		
3	drain2		
4	drain1		
5	source [1]		

[1] Connected to flange.

3. Ordering information

Table 3. Ordering information

Type number	Package		
	Name	Description	Version
BLP2425M10S250P	-	overmolded plastic earless flanged package; 4 leads	OMP-780-4F-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}	gate-source voltage		–6	+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
$R_{th(j-case)}$	thermal resistance from junction to case	T_{case} = 80 °C; P_L = 250 W	0.32	K/W

6. Characteristics

Table 6. DC characteristics

T_j = 25 °C, per section; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{(BR)DSS}$	drain-source breakdown voltage	V_{GS} = 0 V; I_D =1.52 mA	65.00	-	-	V
$V_{GS(th)}$	gate-source threshold voltage	V_{DS} = 32 V; I_D = 50 mA	1.33	1.82	2.33	V
I_{DSS}	drain leakage current	V_{GS} = 0 V; V_{DS} = 32 V	-	-	2.8	μA
I_{DSX}	drain cut-off current	V_{GS} = $V_{GS(th)}$ + 3.75 V; V_{DS} = 10 V	-	28.4	-	A
I_{GSS}	gate leakage current	V_{GS} = 11 V; V_{DS} = 0 V	-	-	280	nA
g_{fs}	forward transconductance	V_{DS} = 10 V; I_D = 7.6 A	-	10.1	-	S
$R_{DS(on)}$	drain-source on-state resistance	V_{GS} = $V_{GS(th)}$ + 3.75 V; I_D = 5.32 A	-	95	-	mΩ

Table 7. RF characteristics

Test signal: pulsed at 2450 MHz; RF performance at V_{DS} = 32 V; I_{Dq} = 100 mA; t_p = 100 μs; δ = 10 %; T_{case} = 25 °C; unless otherwise specified; in a class-AB production test circuit.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
G_p	power gain	P_L = 250 W	13	15	-	dB
RL_{in}	input return loss	P_L = 250 W	-	−15	-	dB
η_D	drain efficiency	P_L = 250 W	61	64	-	%

7. Test information

7.1 Ruggedness in class-AB operation

The BLP2425M10S250P is capable of withstanding a load mismatch corresponding to VSWR = 20 : 1 through all phases with a time rate of 55 ms/degree under the following conditions: V_{DS} = 32 V; I_{Dq} = 100 mA; P_L = 260 W (CW); f = 2450 MHz; T_{case} = 25 °C.

7.2 Impedance information

Table 8. Typical impedance

Measured load-pull data; measured on a single section of the push-pull transistor; I_{Dq} = 50 mA; V_{DS} = 32 V.

f	Z_S [1]	Z_L [1]
(MHz)	(Ω)	(Ω)
2400	12.1 − 1.9j	4.1 − 5.7j
2450	8.2 − 0.5j	3.7 − 5.5j
2500	5.4 − 1.0j	3.3 − 5.4j

[1] Z_S and Z_L defined in Figure 1.

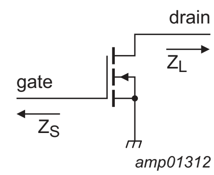
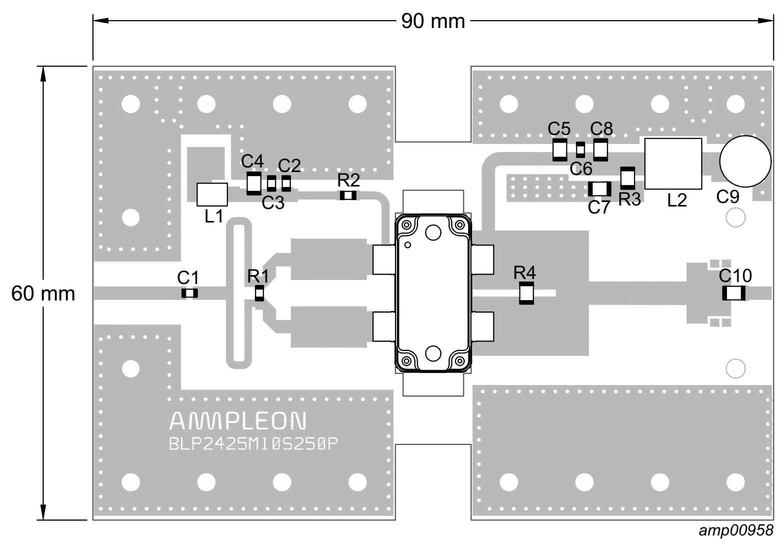


Fig 1. Definition of transistor impedance

7.3 Test circuit



Printed-Circuit Board (PCB): Rogers TC350; thickness = 0.762 mm.

See Table 9 for a list of components.

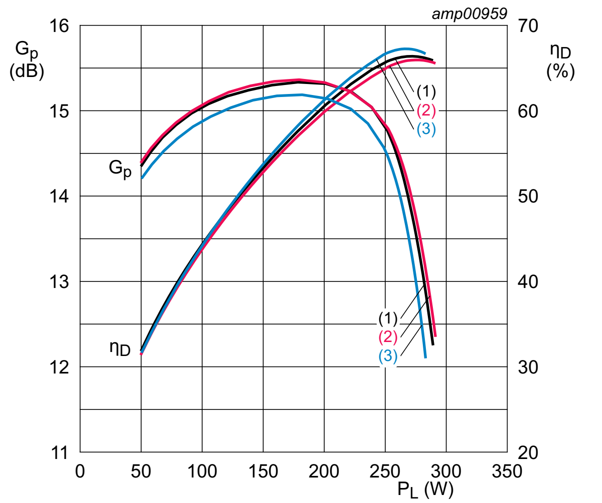
Fig 2. Component layout demo circuit

Table 9. List of components

See Figure 2 for component layout.

Component	Description	Value	Remarks
C1, C2	multilayer ceramic chip capacitor	22 pF	ATC 800A
C3, C6	multilayer ceramic chip capacitor	1000 pF, 50 V	C0805
C4, C8	multilayer ceramic chip capacitor	1 μF, 50 V	C1206
C5, C10	multilayer ceramic chip capacitor	22 pF	ATC 800B
C7	multilayer ceramic chip capacitor	560 pF	ATC 100B
C9	electrolytic capacitor	100 μF, 63 V	
L1	ferrite bead inductor	47 Ω, 100 MHz	Fair-Rite: 2743019447
L2	inductor	0.05 μH	Coilcraft: SLC7530D-500MLC
R1	chip resistor	100 Ω	R0805
R2	chip resistor	10 Ω	R0805
R3	chip resistor	1.5 Ω	R1206
R4	chip resistor	10 Ω	R1206

7.4 Graphical data



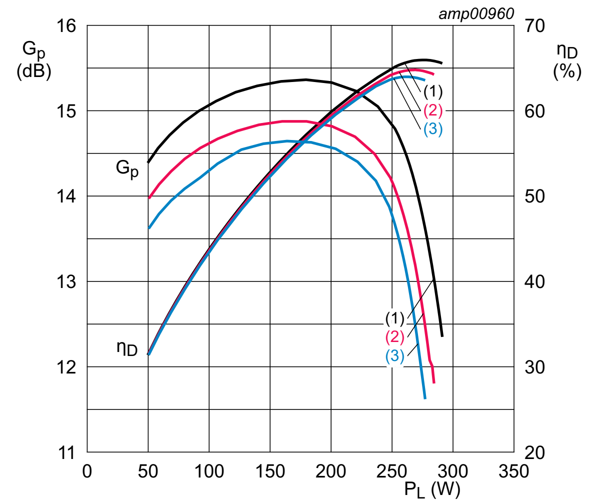
Test signal: CW; V_{DS} = 32 V; I_{Dq} = 100 mA;
T_{case} = 42 °C; T_{water} = 25 °C (at water-cooled heatsink).

(1) f = 2400 MHz

(2) f = 2450 MHz

(3) f = 2500 MHz

Fig 3. Power gain and drain efficiency as function of output power; typical values



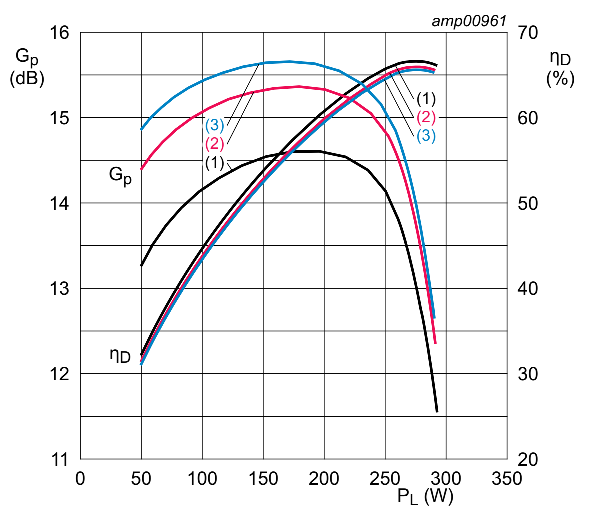
Test signal: CW; V_{DS} = 32 V; I_{Dq} = 100 mA;
f = 2450 MHz; at water-cooled heatsink.

(1) T_{case} = 42 °C; T_{water} = 25 °C

(2) T_{case} = 63 °C; T_{water} = 45 °C

(3) T_{case} = 83 °C; T_{water} = 65 °C

Fig 4. Power gain and drain efficiency as function of output power; typical values



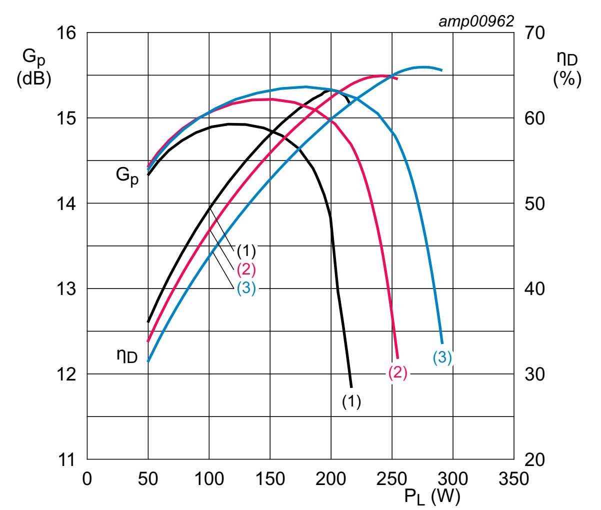
Test signal: CW; V_{DS} = 32 V; T_{case} = 42 °C;
f = 2450 MHz; T_{water} = 25 °C (at water-cooled heatsink).

(1) I_{Dq} = 20 mA

(2) I_{Dq} = 100 mA

(3) I_{Dq} = 200 mA

Fig 5. Power gain and drain efficiency as function of output power; typical values



Test signal: CW; I_{Dq} = 100 mA; T_{case} = 42 °C;
f = 2450 MHz; T_{water} = 25 °C (at water-cooled heatsink).

(1) V_{DS} = 28 V

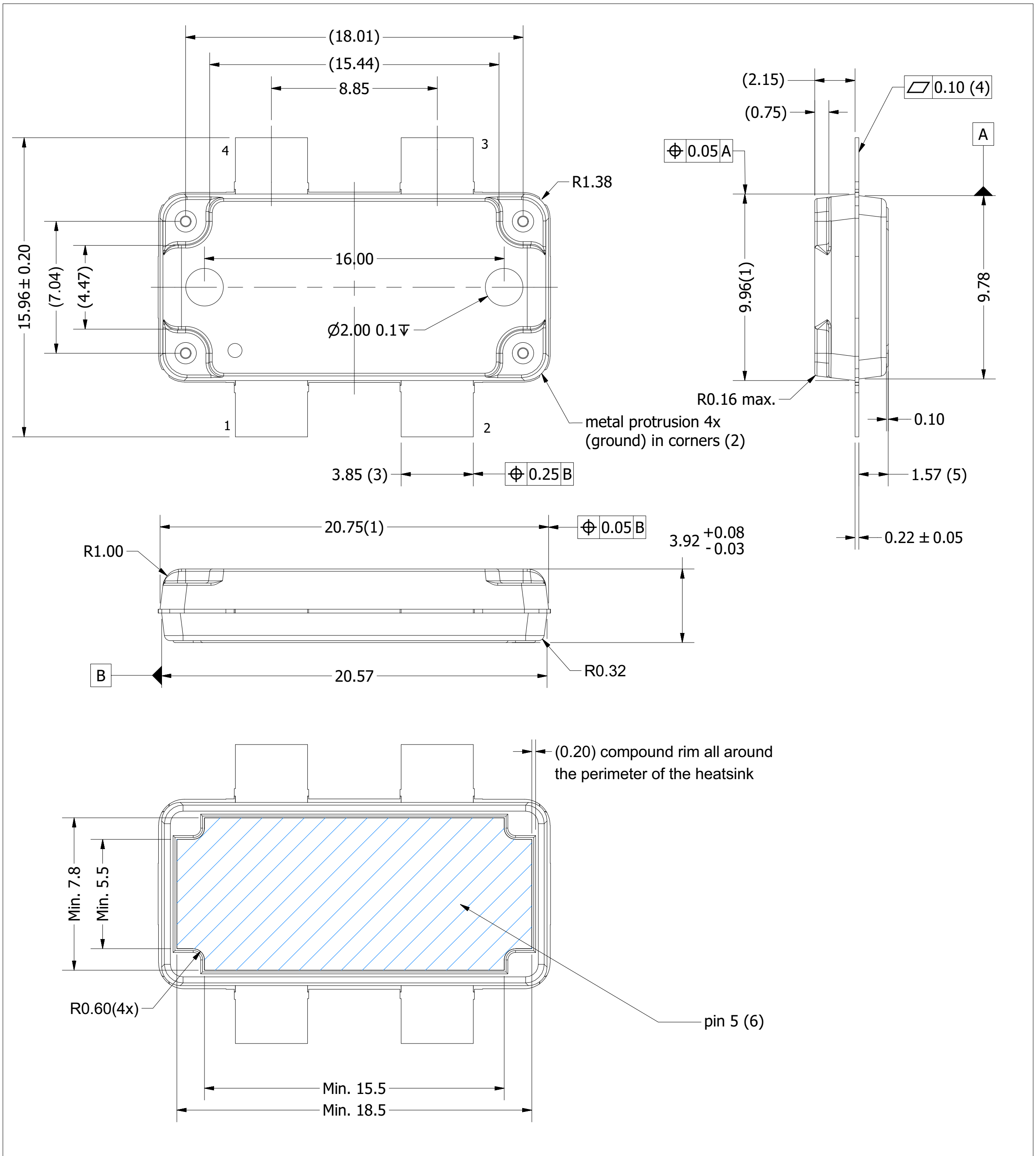
(2) V_{DS} = 30 V

(3) V_{DS} = 32 V

Fig 6. Power gain and drain efficiency as function of output power; typical values

8. Package outline

OMP-780-4F-1

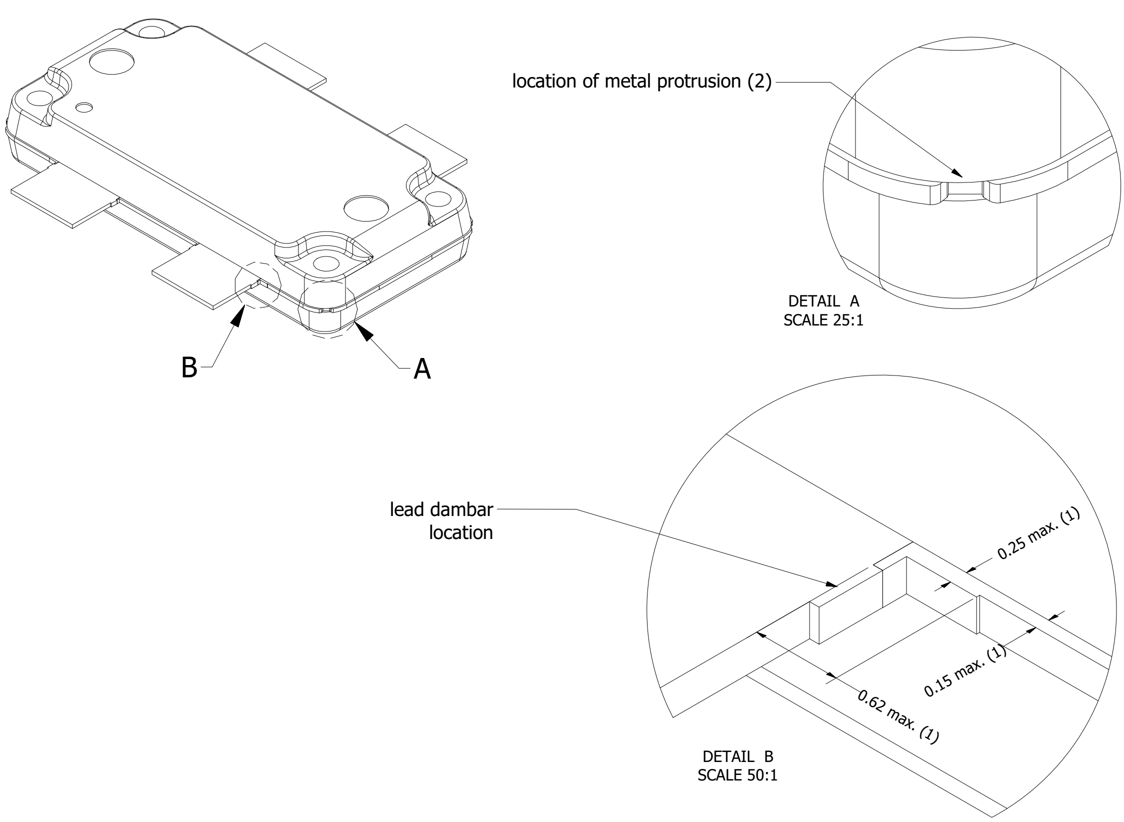


Package outline drawing: OMP-780-4F-1	units in mm.	Tolerances unless otherwise stated: Dimension: ± 0.05 Angle: ± 1°	Revision: 0 Revision date: 3/1/2018
		Third angle projection	Sheet 1 of 2

Fig 7. Package outline OMP-780-4F-1 (sheet 1 of 2)

OMP-780-4F-1

Drawing Notes	
Items	Description
(1)	Dimensions are excluding mold protrusion. All areas located adjacent to the leads have a maximum mold protrusion of 0.25 mm (per side) and max. 0.62 mm in length. At all other areas the mold protrusion is maximum 0.15 mm per side. See also detail B.
(2)	The metal protrusion (tie bars) in the corner will not stick out of the molding compound protrusions (detail A).
(3)	The lead dambar (metal) protrusions are not included. Add 0.14 mm max to the total lead dimension at the dambar location.
(4)	The lead coplanarity over all leads is 0.1 mm maximum.
(5)	Dimension is measured 0.5 mm from the edge of the top package body.
(6)	The hatched area indicates the exposed metal heatsink.
(7)	The leads and exposed heatsink are plated with matte Tin (Sn).



Package outline drawing: OMP-780-4F-1	units in mm.	Tolerances unless otherwise stated: Dimension: ± 0.05 Angle: ± 1°	Revision: 0 Revision date: 3/1/2018
		Third angle projection	Sheet 2 of 2

Fig 8. Package outline OMP-780-4F-1 (sheet 2 of 2)

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 10. ESD sensitivity

ESD model	Class
Charged Device Model (CDM); According to ANSI/ESDA/JEDEC standard JS-002	C1 [1]
Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001	1C [2]

[1] CDM classification C1 is granted to any part that passes after exposure to an ESD pulse of 250 V.

[2] HBM classification 1C is granted to any part that passes after exposure to an ESD pulse of 1000 V.

10. Abbreviations

Table 11. Abbreviations

Acronym	Description
CW	Continuous Wave
ESD	ElectroStatic Discharge
LDMOS	Laterally Diffused Metal-Oxide Semiconductor
MTF	Median Time to Failure
RoHS	Restriction of Hazardous Substances
VSWR	Voltage Standing Wave Ratio

11. Revision history

Table 12. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BLP2425M10S250P v.1	20200326	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".

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14. Contents

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