

# BLC2425M10LS500P

Power LDMOS transistor

Rev. 2 — 21 March 2019

AMPLEON

Product data sheet

## 1. Product profile

### 1.1 General description

500 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 BLC2425M10LS500P is designed for high-power CW applications and is assembled in a high performance plastic package.

**Table 1. Typical performance**

RF performance at  $V_{DS} = 32\text{ V}$ ;  $I_{DQ} = 20\text{ mA}$ ;  $T_{case} = 25\text{ °C}$  in a class-AB application circuit.

| Test signal   | f     | $V_{DS}$ | $P_{L(AV)}$ | $G_p$ | $\eta_D$ |
|---------------|-------|----------|-------------|-------|----------|
|               | (MHz) | (V)      | (W)         | (dB)  | (%)      |
| CW            | 2450  | 32       | 500         | 15.0  | 67.5     |
| CW pulsed [1] | 2450  | 32       | 500         | 15.0  | 67       |

[1]  $t_p = 100\text{ }\mu\text{s}$ ;  $\delta = 10\text{ }\%$

### 1.2 Features and benefits

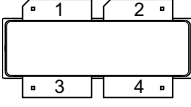
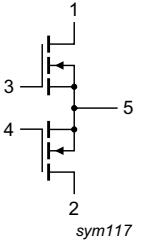
- High efficiency
- Excellent ruggedness
- Integrated ESD protection
- Designed for broadband operation (2400 MHz to 2500 MHz)
- Input and output internally matched
- For RoHS compliance see the product details on the Ampleon website

### 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      | drain1      |  |  |
| 2      | drain2      |                                                                                     |                                                                                     |
| 3      | gate1       |                                                                                     |                                                                                     |
| 4      | gate2       |                                                                                     |                                                                                     |
| flange | source      |                                                                                     |                                                                                     |

## 3. Ordering information

Table 3. Ordering information

| Type number      | Package |                                                     |           |
|------------------|---------|-----------------------------------------------------|-----------|
|                  | Name    | Description                                         | Version   |
| BLC2425M10LS500P | -       | air cavity plastic earless flanged package; 4 leads | SOT1250-1 |

## 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 | $T_{case} = 75\text{ °C}$ ; $P_L = 500\text{ W}$ | 0.17 | K/W  |

## 6. Characteristics

**Table 6. DC characteristics**

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

| Symbol        | Parameter                        | Conditions                                                        | Min  | Typ  | Max  | Unit             |
|---------------|----------------------------------|-------------------------------------------------------------------|------|------|------|------------------|
| $V_{(BR)DSS}$ | drain-source breakdown voltage   | $V_{GS} = 0\text{ V}$ ; $I_D = 2.7\text{ mA}$                     | 65   | -    | -    | V                |
| $V_{GS(th)}$  | gate-source threshold voltage    | $V_{DS} = 32\text{ V}$ ; $I_D = 20\text{ mA}$                     | 1.75 | 2.2  | 2.65 | V                |
| $I_{DSS}$     | drain leakage current            | $V_{GS} = 0\text{ V}$ ; $V_{DS} = 32\text{ V}$                    | -    | -    | 4.2  | $\mu\text{A}$    |
| $I_{DSX}$     | drain cut-off current            | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ;<br>$V_{DS} = 10\text{ V}$ | -    | 59.3 | -    | A                |
| $I_{GSS}$     | gate leakage current             | $V_{GS} = 11\text{ V}$ ; $V_{DS} = 0\text{ V}$                    | -    | -    | 40   | nA               |
| $g_{fs}$      | forward transconductance         | $V_{DS} = 10\text{ V}$ ; $I_D = 15.2\text{ A}$                    | -    | 21   | -    | S                |
| $R_{DS(on)}$  | drain-source on-state resistance | $V_{GS} = V_{GS(th)} + 3.75\text{ V}$ ;<br>$I_D = 10.64\text{ A}$ | -    | 45.5 | -    | $\text{m}\Omega$ |

**Table 7. RF characteristics**

Test signal: CW pulsed at 2450 MHz; RF performance at  $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 10\text{ mA}$  per section;  
 $T_{case} = 25\text{ }^{\circ}\text{C}$ ; unless otherwise specified; in a class-AB production test circuit.

| Symbol    | Parameter         | Conditions           | Min  | Typ  | Max | Unit |
|-----------|-------------------|----------------------|------|------|-----|------|
| $G_p$     | power gain        | $P_L = 500\text{ W}$ | 13.2 | 14.5 | -   | dB   |
| $RL_{in}$ | input return loss | $P_L = 500\text{ W}$ | -    | -18  | -5  | dB   |
| $\eta_D$  | drain efficiency  | $P_L = 500\text{ W}$ | 64   | 67   | -   | %    |

## 7. Test information

### 7.1 Ruggedness in class-AB operation

The BLC2425M10LS500P is capable of withstanding a load mismatch corresponding to  $VSWR = 20 : 1$  through all phases under the following conditions:  $V_{DS} = 32\text{ V}$ ;  $I_{Dq} = 20\text{ mA}$ ;  $P_L = 500\text{ W}$  (CW);  $f = 2450\text{ MHz}$ .

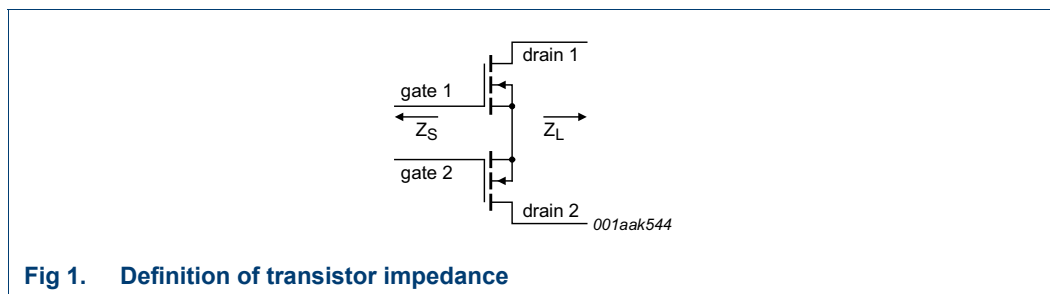
### 7.2 Impedance information

**Table 8. Typical impedance**

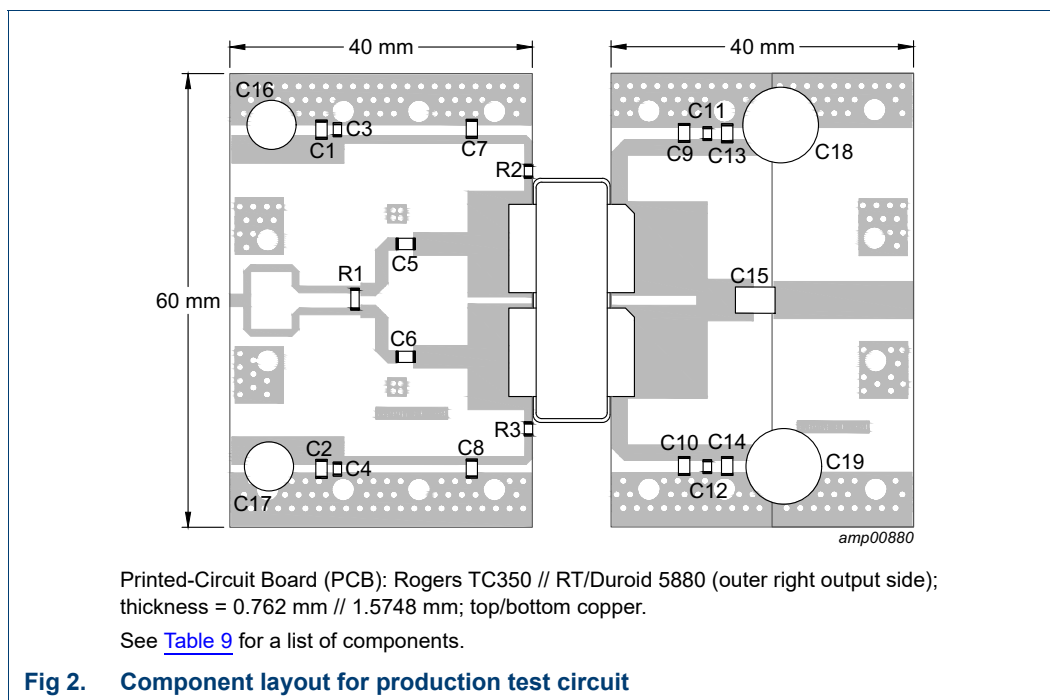
Measured load-pull data half device. Typical values unless otherwise specified.  $I_{Dq} = 20\text{ mA}$ ;  
 $V_{DS} = 32\text{ V}$ .

| f<br>(MHz) | $Z_S$ [1]<br>( $\Omega$ ) | $Z_L$ [1]<br>( $\Omega$ ) |
|------------|---------------------------|---------------------------|
| 2400       | $2.95 - j6.51$            | $2.3 - j2.6$              |
| 2450       | $4.50 - j6.95$            | $2.1 - j2.4$              |
| 2500       | $5.58 - j5.66$            | $2.2 - j2.2$              |

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



### 7.3 Test circuit

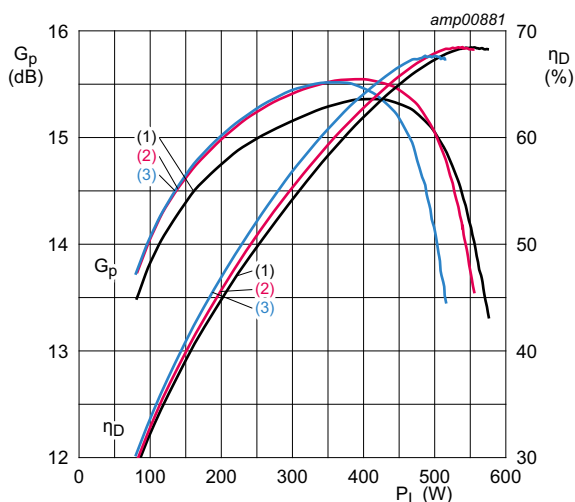


**Table 9. List of components**

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

| Component        | Description                       | Value             | Remarks  |
|------------------|-----------------------------------|-------------------|----------|
| C1, C2           | multilayer ceramic chip capacitor | 1 $\mu$ F, 50 V   | SMD 1210 |
| C3, C4, C11, C12 | multilayer ceramic chip capacitor | 1 nF, 50 V        | SMD 0805 |
| C5, C6, C7, C8   | multilayer ceramic chip capacitor | 22 pF             | ATC 800A |
| C9, C10          | multilayer ceramic chip capacitor | 22 pF             | ATC 800B |
| C13, C14         | multilayer ceramic chip capacitor | 4.7 $\mu$ F, 50 V | SMD 1210 |
| C15              | mica capacitor                    | 12 pF             | MIN02    |
| R1               | resistor                          | 100 $\Omega$      | SMD 1206 |
| R2, R3           | resistor                          | 10 $\Omega$       | SMD 0603 |
| C16, C17         | electrolytic capacitor            | 22 $\mu$ F, 63 V  |          |
| C18, C19         | electrolytic capacitor            | 470 $\mu$ F, 63 V |          |

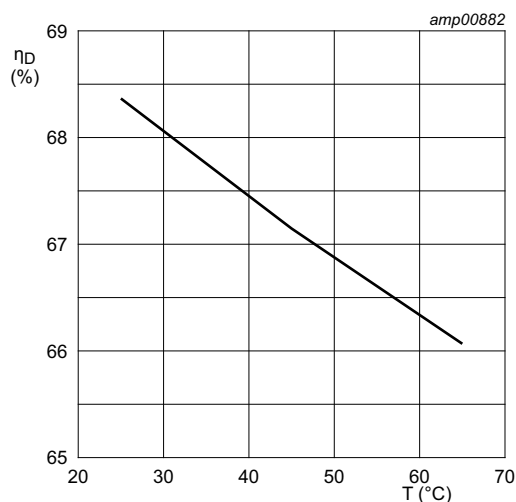
## 7.4 Graphical data



$V_{DS} = 32 \text{ V}$ ;  $I_{DQ} = 20 \text{ mA}$ .

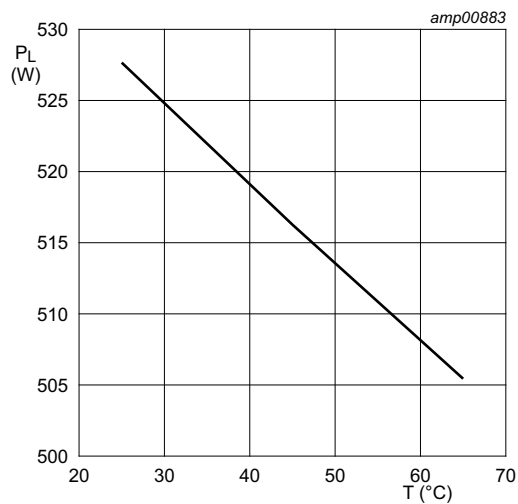
- (1)  $f = 2400 \text{ MHz}$
- (2)  $f = 2450 \text{ MHz}$
- (3)  $f = 2500 \text{ MHz}$

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



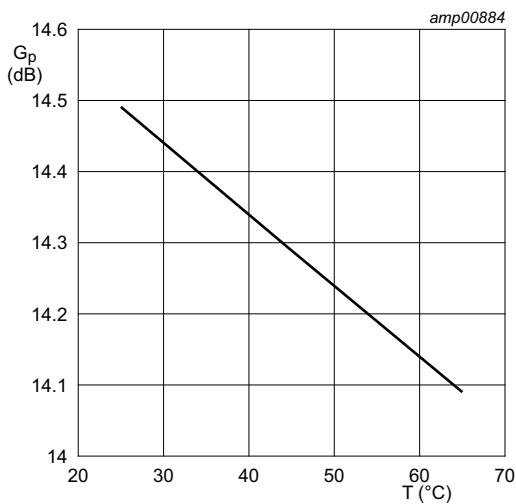
$V_{DS} = 32 \text{ V}$ ;  $I_{DQ} = 20 \text{ mA}$ ;  $f = 2450 \text{ MHz}$ ; at  $P_{L(1dB)}$ .

**Fig 4. Drain efficiency as a function of temperature; typical values**



$V_{DS} = 32 \text{ V}$ ;  $I_{DQ} = 20 \text{ mA}$ ;  $f = 2450 \text{ MHz}$ ; at  $P_{L(1dB)}$ .

**Fig 5. Output power as a function of temperature; typical values**



$V_{DS} = 32 \text{ V}$ ;  $I_{DQ} = 20 \text{ mA}$ ;  $f = 2450 \text{ MHz}$ ; at  $P_{L(1dB)}$ .

**Fig 6. Power gain as a function of temperature; typical values**

8. Package outline

Plastic earless flanged cavity package; 4 leads

SOT1250-1

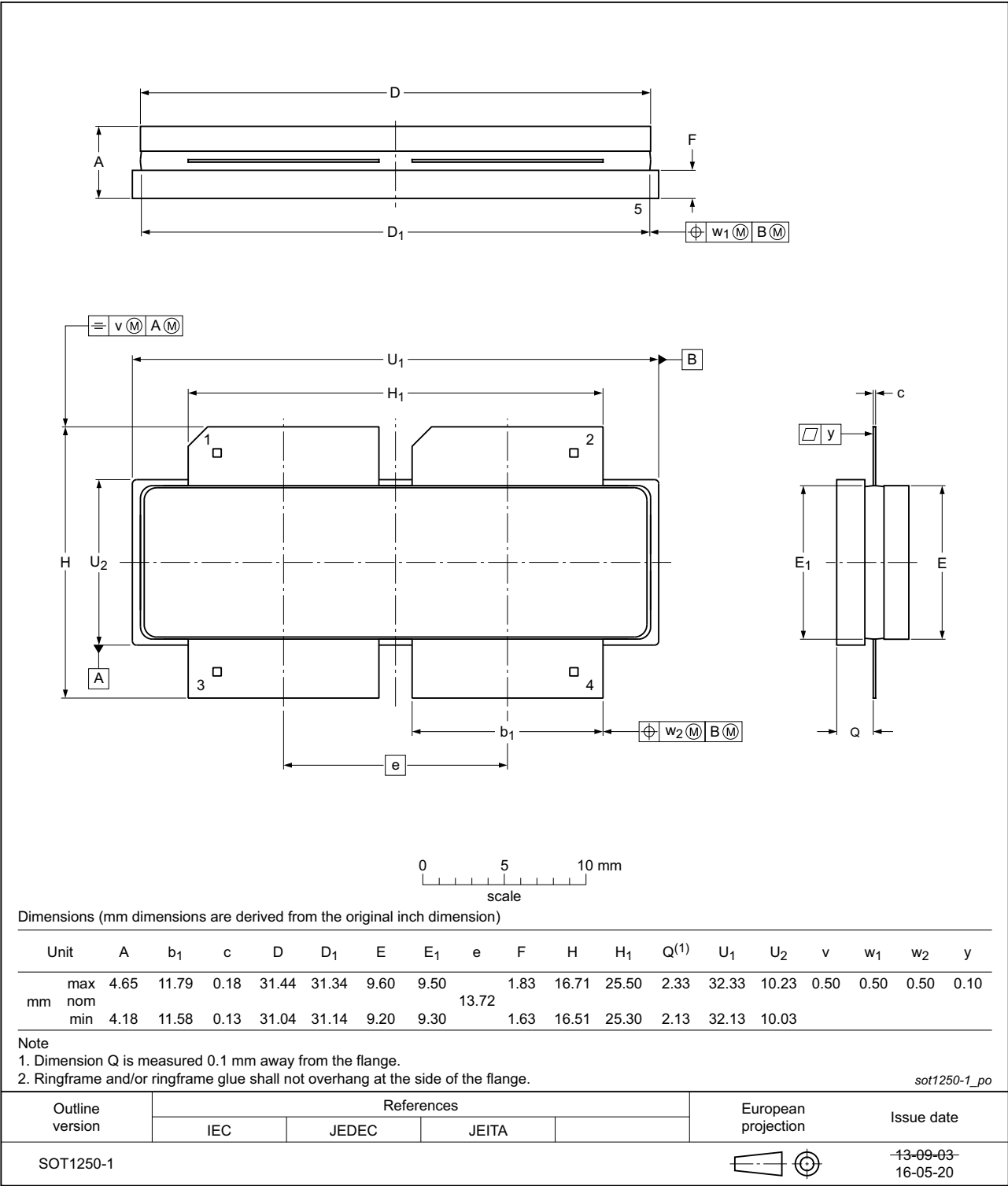


Fig 7. Package outline SOT1250-1

## 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 10. ESD sensitivity

| ESD model                                                                | Class                   |
|--------------------------------------------------------------------------|-------------------------|
| Charged Device Model (CDM); According to ANSI/ESDA/JEDEC standard JS-002 | C2A <a href="#">[1]</a> |
| Human Body Model (HBM); According to ANSI/ESDA/JEDEC standard JS-001     | 2 <a href="#">[2]</a>   |

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

[2] HBM classification 2 is granted to any part that passes after exposure to an ESD pulse of 2000 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          |
| SMD     | Surface Mounted Device                       |
| VSWR    | Voltage Standing-Wave Ratio                  |

## 11. Revision history

Table 12. Revision history

| Document ID          | Release date                                                      | Data sheet status  | Change notice | Supersedes           |
|----------------------|-------------------------------------------------------------------|--------------------|---------------|----------------------|
| BLC2425M10LS500P v.2 | 20190321                                                          | Product data sheet | -             | BLC2425M10LS500P v.1 |
| Modifications        | • <a href="#">Table 9 on page 4</a> : corrected value C18 and C19 |                    |               |                      |
| BLC2425M10LS500P v.1 | 20190114                                                          | Product data sheet | -             | -                    |

## 12. Legal information

### 12.1 Data sheet status

| Document status <sup>[1][2]</sup> | Product status <sup>[3]</sup> | 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.                                     |

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[2] The term 'short data sheet' is explained in section "Definitions".

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