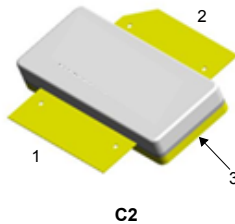


950 W, 50 V, HF to 500 MHz RF power LDMOS transistor



| Pin connection | |
|----------------|----------------------|
| Pin | Connection |
| 1 | Gate |
| 2 | Drain |
| 3 | Source (bottom side) |



| Product status link |
|------------------------------|
| RF5L05950CF2 |

| Product summary | |
|--------------------|-------------------|
| Order code | RF5L05950CF2 |
| Marking | 5L05950 |
| Package | C2 |
| Packing | Tape and reel 13" |
| Base/bulk quantity | 100/100 |

Features

| Order code | Frequency | V _{DD} | P _{OUT} | Gain | Efficiency |
|-----------------------------|-----------|-----------------|------------------|-------|------------|
| RF5L05950CF2 ⁽¹⁾ | 108 MHz | 50 V | 2000 W | 20 dB | 76% |

1. Measured on 88-108 MHz wideband test board with two RF5L05950CF2 devices connected in push-pull.

- High efficiency and linear gain operations
- Integrated ESD protection
- Large positive and negative gate-source voltage range for improved class C operation
- Excellent thermal stability, low HCI drift
- In compliance with the european directive 2002/95/EC

Applications

- 30-88 MHz/136-174 MHz ground communication
- 1.6-30 MHz HF transceiver
- Plasma generator
- Particle accelerator
- FM and VHF TV broadcast

Description

The RF5L05950CF2 is a 950 W, 50 V, high performance, unmatched LDMOS FET, designed for wideband commercial and industrial applications in the frequency range from HF to 500 MHz. It can be used for both CW and pulse application. It is featured for high power and high ruggedness, suitable for industrial, scientific and medical application, as well as FM radio, VHF TV and aerospace applications.

1 Electrical ratings

Table 1. Absolute maximum ratings ($T_C = 25\text{ °C}$)

| Symbol | Parameter | Value | Unit |
|-----------|------------------------------|------------|------|
| V_{DS} | Drain-source voltage | 110 | V |
| V_{GS} | Gate-source voltage | -8 to 10 | V |
| V_{DD} | Maximum operating voltage | 55 | V |
| T_{STG} | Storage temperature range | -65 to 150 | °C |
| T_J | Maximum junction temperature | 200 | °C |

Table 2. Thermal data

| Symbol | Parameter | Value | Unit |
|------------------|--------------------------------------|-------|------|
| $R_{thJC}^{(1)}$ | Thermal resistance, junction-to-case | 0.08 | °C/W |

1. $T_C = 85\text{ °C}$, $P_{OUT} = 2000\text{ W}$, pulsed CW output at 108 MHz, two RF5L05950CF2 devices connected in push-pull.

Table 3. ESD protection

| Symbol | Test methodology | Class |
|--------|--|-------|
| HBM | Human body model (according to ANSI/ESDA/JEDEC JS001-2017) | 2 |
| CDM | Charge device model (according to ANSI/ESDA/JEDEC JS-002-2014) | C3 |

2 Electrical characteristics

Table 4. Static

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---------------|---|--|------|------|-----------|---------------|
| $V_{(BR)DSS}$ | Drain-source breakdown voltage | $V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$ | 110 | - | | V |
| I_{DSS} | Zero gate voltage drain leakage current | $V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}$ | | - | 1 | μA |
| | | $V_{GS} = 0\text{ V}, V_{DS} = 90\text{ V}$ | | - | | |
| I_{GSS} | Gate-source leakage current | $V_{GS} = -8/10\text{ V}, V_{DS} = 0\text{ V}$ | | - | ± 100 | nA |
| $V_{GS(th)}$ | Gate threshold voltage | $V_{DS} = 50\text{ V}, I_D = 600\ \mu\text{A}$ | 2.3 | - | 2.9 | V |
| $V_{GS(Q)}$ | Gate quiescent voltage | $V_{DS} = 50\text{ V}, I_D = 230\text{ mA}$ | 2 | - | 5 | V |
| $V_{DS(on)}$ | Static drain-source on-voltage | $V_{GS} = 10\text{ V}, I_D = 6\text{ A}$ | | - | 1 | V |
| $I_{DS(on)}$ | Static drain-source on-current | $V_{GS} = 10\text{ V}, V_{DS} = 100\text{ mV}$ | | - | 2.5 | A |
| $R_{DS(on)}$ | Drain-source on-state resistance | $V_{GS} = 10\text{ V}, V_{DS} = 100\text{ mV}$ | | - | 1 | Ω |

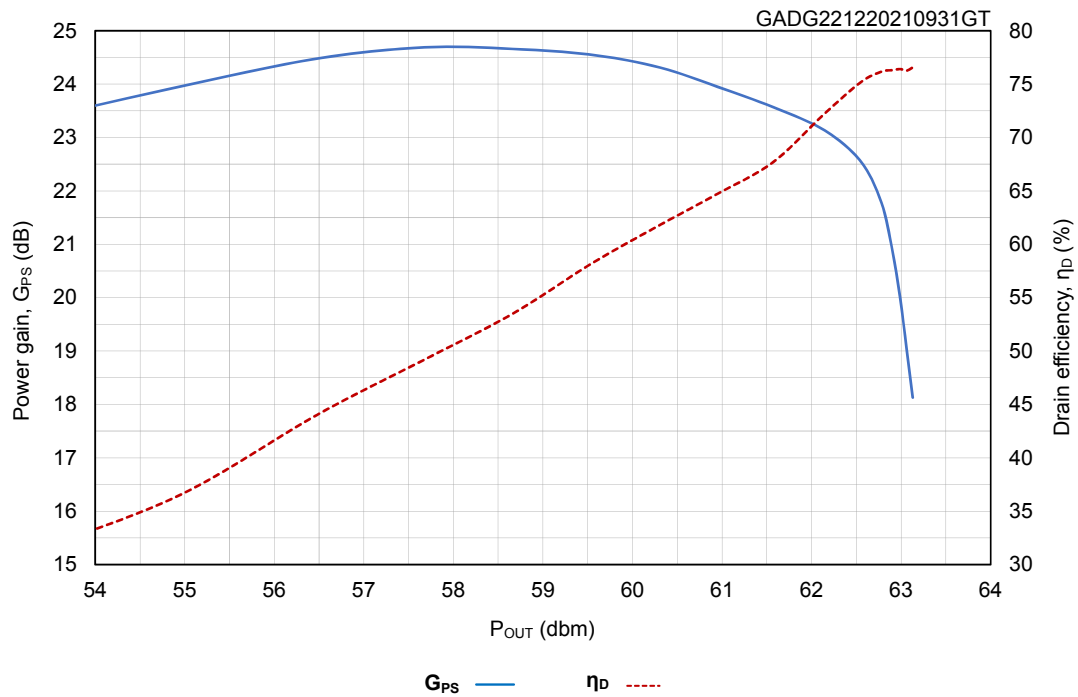
Table 5. Dynamic

| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|-----------|------------------|---|------|------|------|------|
| P_{OUT} | Output power | f = 108 MHz, pulsed CW, 3 dB compression | - | 2000 | | W |
| G_{PS} | Power gain | | - | 20 | | dB |
| η_D | Drain efficiency | | - | 76 | | % |
| VSWR | Load mismatch | $P_{OUT} = 2000\text{ W}$, all phases | - | | 10:1 | |

- Note:
- $V_{DD} = 50\text{ V}, I_{DQ} = 200\text{ mA}$, pulse width = 100 μs , duty cycle = 10%.
 - Measured on 88-108 MHz wideband test board with two RF5L05950CF2 devices connected in push-pull.

3 Typical performances

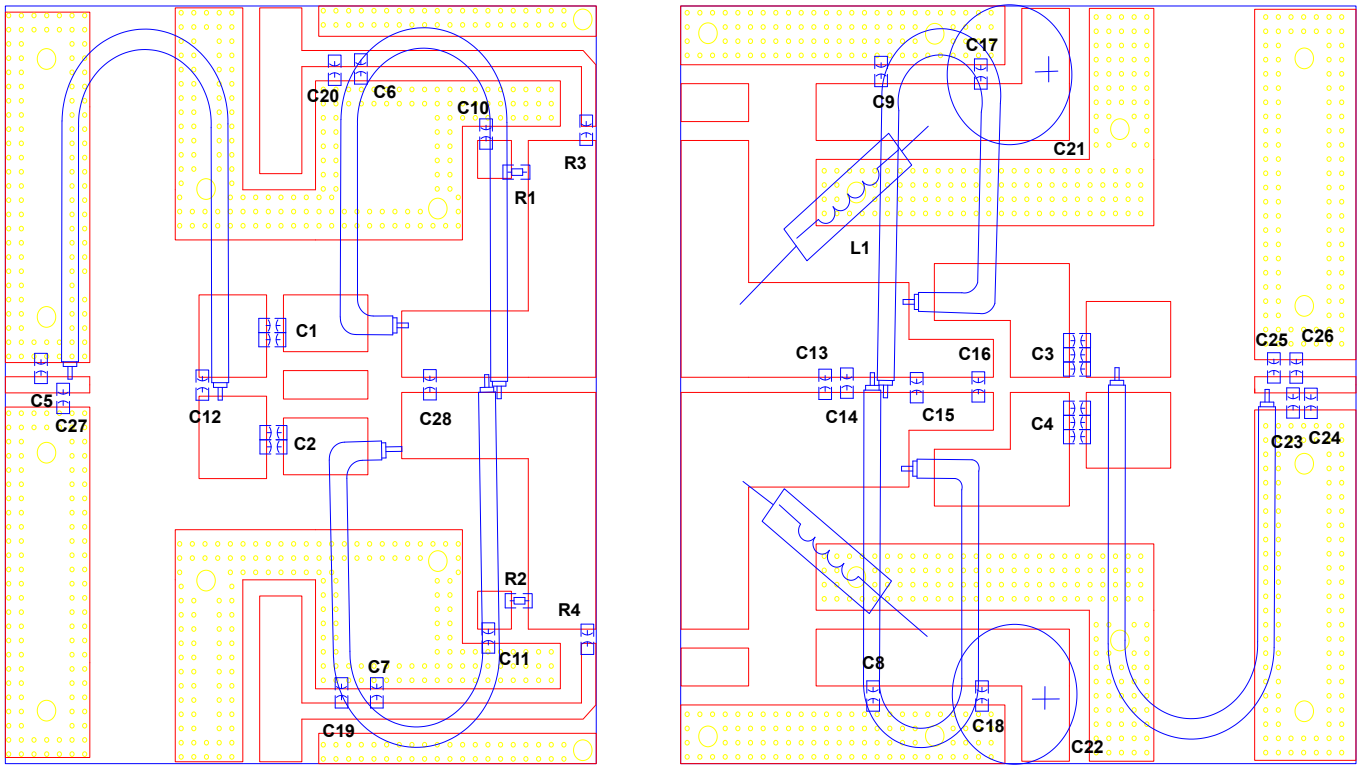
Figure 1. Power gain and drain efficiency vs output power (f = 108 MHz)



- Note:
1. $V_{DD} = 50\text{ V}$, $I_{DQ} = 200\text{ mA}$, pulse width = 100 μs , duty cycle = 10%.
 2. Measured on 88-108 MHz wideband test board with two RF5L05950CF2 devices connected in push-pull.

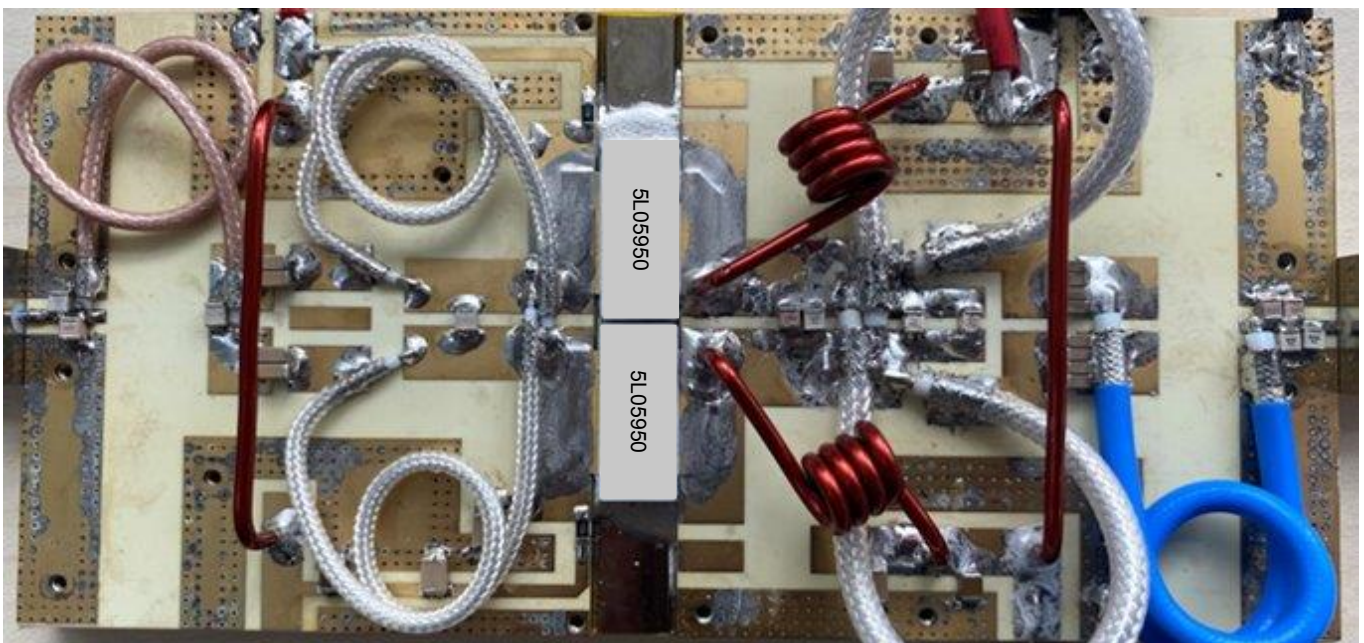
4 Test circuits

Figure 2. Test circuit layout (88–108 MHz frequency band)



GADG221220210957GT

Figure 3. Test circuit photo



GADG221220211006GT

Table 6. Components list

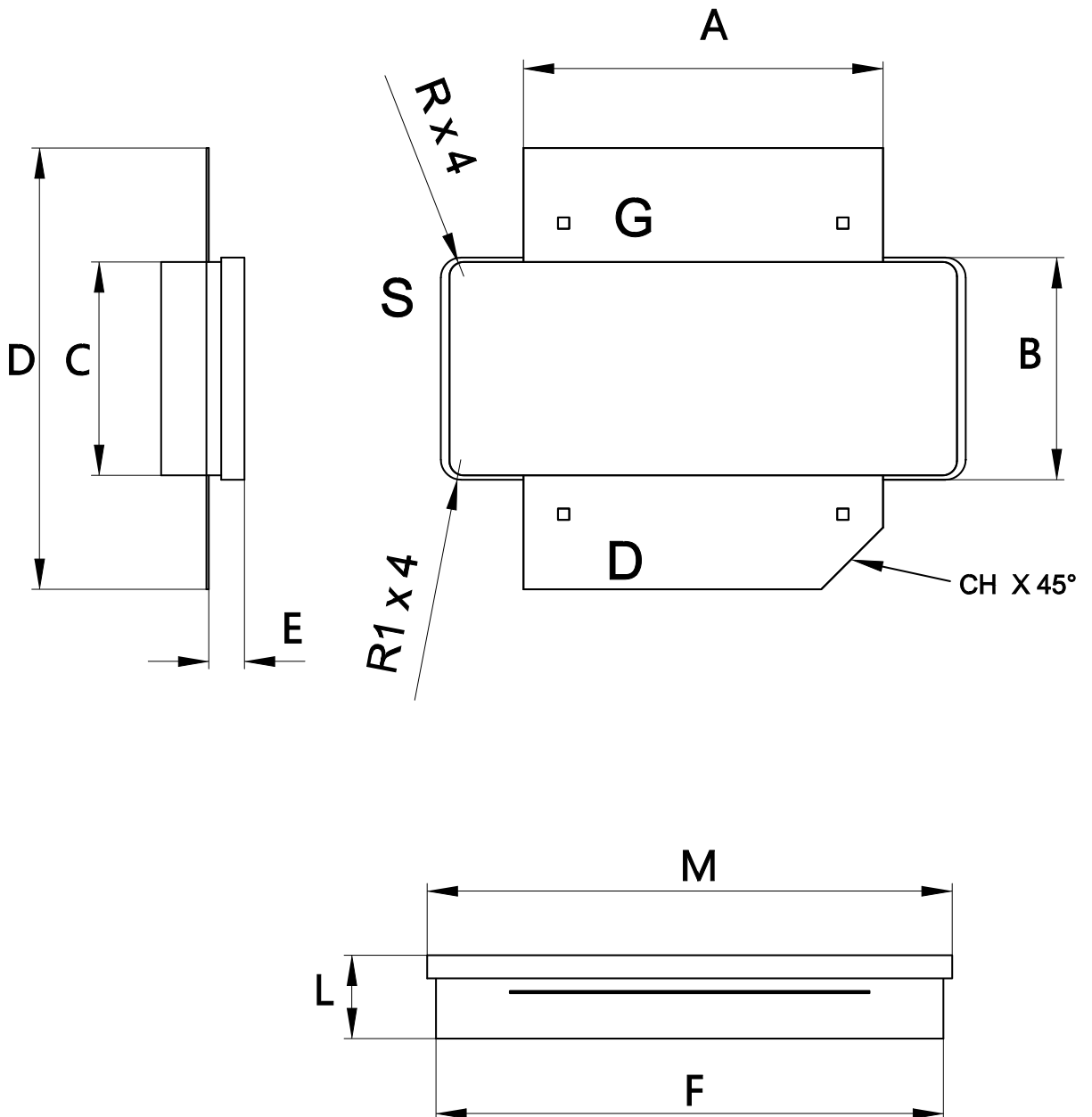
| Component | Value | Reference |
|--------------------|---|----------------------------|
| C1, C2 | 10 nF (2x) | C4532X7R3D103KT000N |
| C3, C4 | 470 pF (3x) | ATC800B |
| C5 | 10 pF | ATC800B |
| C6-C11 | 100 nF | C4532X7R3D103KT000N |
| C12 | 47 pF | ATC800B |
| C13, C14, C15, C16 | 20 pF | ATC800B |
| C17, C18, C19, C20 | 10 μ F | 100 V ceramic capacitor |
| C23, C24 | 3.0 pF | DLC70B |
| C25, C26 | 3.9 pF | DLC70B |
| C21, C22 | 2200 μ F | 63V electrolytic capacitor |
| C27 | 27 pF | ATC800B |
| C28 | 68 pF | ATC800B |
| R1,R2 | 16 Ω | 0805 chip resistor |
| R3,R4 | 470 Ω | 0805 chip resistor |
| T1 | 50 Ω 150mm | SFF-50-1.5 |
| T2,T3 | 25 Ω line length = 150 mm 9:1 | SFF-25-1.5 |
| T4,T5 | 12.5 Ω line length = 150 mm 9:1 | SFF-12.5-1.5 |
| T6 | 25 Ω 150mm | RG402-3 |
| L1, L2 | 4tums Φ 1 mm | |
| PCB | 0.762 mm (0.030") thick, $\epsilon_r = 3.48$, Rogers RO4350B | |

5 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK** packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

5.1 C2 package information

Figure 4. C2 package outline



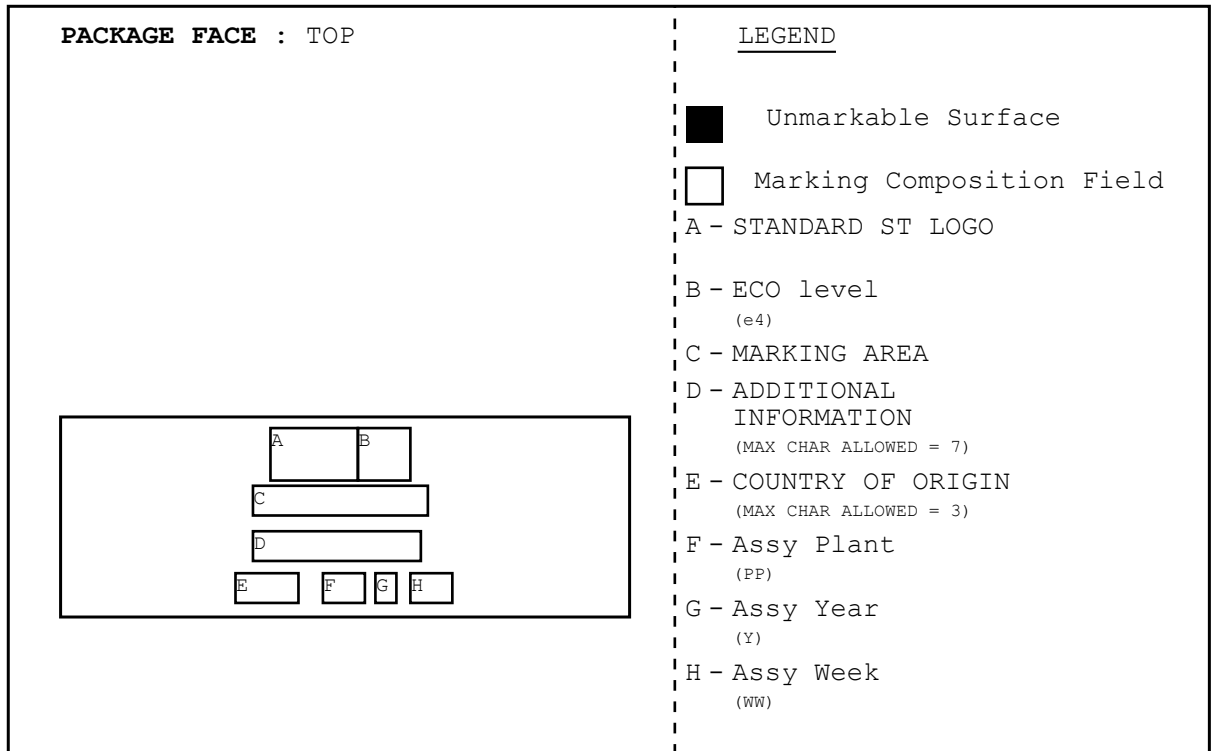
DM00666714_2

Table 7. C2 package mechanical data

| Symbol | Millimeters | | |
|--------|-------------|--------|--------|
| | Min. | Typ. | Max. |
| A | 15.713 | 15.840 | 15.967 |
| B | 9.653 | 9.780 | 9.907 |
| C | 9.273 | 9.400 | 9.527 |
| D | 19.303 | 19.430 | 19.557 |
| E | 1.443 | 1.570 | 1.697 |
| F | 22.223 | 22.350 | 22.477 |
| L | 3.543 | 3.670 | 3.797 |
| M | 22.993 | 23.120 | 23.247 |
| CH | | 2.720 | |
| R | | 0.630 | |
| R1 | | 0.880 | |

5.2 Marking information

Figure 5. Marking composition



GADG040220211644GT

Revision history

Table 8. Document revision history

| Date | Version | Changes |
|-------------|---------|---|
| 24-May-2021 | 1 | First release. |
| 23-Dec-2021 | 2 | Updated Features and Description on cover page. Updated Table 1. Absolute maximum ratings ($T_C = 25\text{ °C}$). Updated Section 2 Electrical characteristics . Added Section 3 Typical performances and Section 4 Test circuits . Minor text changes. |

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