

CHT-PMOS30 PRELIMINARY DATASHEET

Version: 1.3
4-Oct-12
(Last Modification Date)

High-Temperature, P-Channel Power Transistor

General description

The CHT-PMOS30xx is a family of high voltage P-channel power MOSFET's designed to achieve high performance in an extremely wide temperature range: typical operation temperature goes from -55°C to 225°C.

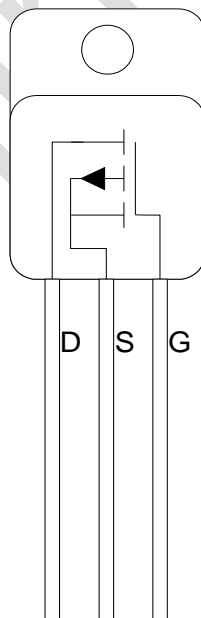
Applications

- Aeronautics & aerospace,
- Industrial,
- Well logging,
- Automotive.

Features

- Qualified from -55 to +225°C (Tj)
- Operational up to +250°C (Tj)
- Drain voltage up to 30V
- Typical output current
 - CHT-PMOS3002: 2A @ 225°C
 - CHT-PMOS3004: 4A @ 225°C
 - CHT-PMOS3008: 8A @ 225°C
- R_{DSon}
 - CHT-PMOS3002: 3.9Ω @ 225°C
 - CHT-PMOS3004: 2Ω @ 225°C
 - CHT-PMOS3008: 1Ω @ 225°C
- VGS = +0.5V to -5.5V
- Reverse ESD diode between gate and source.
- Available in TO254 package

Package configurations¹



TO254 (Front view) (Floating case)

¹ Other packages available upon request.

Absolute Maximum Ratings

| | |
|---|---|
| Gate-to-Source voltage V_{GS} | -6V to 1V |
| Pulsed drain current I_{DS} ($T_{pulse} \leq 2\mu s$) | |
| • CHT-PMOS3002: | 2.8A @ -55°C 2.5A @ 25°C 1.9A @ 225°C |
| • CHT-PMOS3004: | 5.6A @ -55°C 5A @ 25°C 3.8A @ 225°C |
| • CHT-PMOS3008: | 11.2A @ -55°C 10A @ 25°C 7.6A @ 225°C |

Operating Conditions

| | |
|----------------------------------|-----------------|
| Gate-to-Source voltage V_{GS} | -5.5V to 0.5V |
| Drain-to-Source voltage V_{DS} | -30V to 0.5V |
| Junction temperature | -55°C to +225°C |

Junction temperature T_j 300°C

ESD Rating (expected)

Human Body Model <1kV

Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied. Frequent or extended exposure to absolute maximum rating conditions or above may affect device reliability.

Electrical characteristics of CHT-PMOS3002

DC Characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$. **Bold** figures point out values valid over the whole temperature range ($T_j = -55^\circ\text{C}$ to $+225^\circ\text{C}$).

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|--|------------|---|-------------|------|-------------|----------|
| Threshold voltage | V_{TH} | $V_{DS} = -50\text{mV}$ | -0.8 | -1.2 | -1.4 | V |
| Drain cut-off current | I_{DSS} | $V_{GS} = 0\text{V}, V_{DS} = -30\text{V}$ | | 13 | | nA |
| Gate leakage current ¹ | I_{GSS} | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}$ | | 150 | | pA |
| Static drain-to-source resistance | R_{DSon} | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, -55^\circ\text{C}$ | | 1.7 | | Ω |
| | | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 25^\circ\text{C}$ | | 2.3 | | Ω |
| | | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 225^\circ\text{C}$ | | 3.9 | | Ω |
| Breakdown drain-to-source voltage ² | V_{BRDS} | $V_{GS} = 0\text{V}$ | -30 | | | V |

Dynamic Characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$. **Bold** figures point out values valid over the whole temperature range ($T_j = -55^\circ\text{C}$ to $+225^\circ\text{C}$).

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------|-----------|---|-----|------------|-----|------|
| Input capacitance | C_{ISS} | $V_{GS} = 0\text{V}, DS$ shorted | | 150 | | pF |
| Output capacitance | C_{OSS} | $V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$ | | 23 | | pF |
| Feedback capacitance | C_{RSS} | $V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$ | | 7 | | pF |

Switching Characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$. **Bold** figures point out values valid over the whole temperature range ($T_j = -55^\circ\text{C}$ to $+225^\circ\text{C}$).

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------|-----------|--|-----|------------|-----|------|
| Turn-on delay time | T_{on} | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | 30 | | ns |
| Rise time | T_R | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | 200 | | ns |
| Turn-off delay time | T_{off} | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | 60 | | ns |
| Fall time | T_F | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | 60 | | ns |
| Drain current | I_D | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse, -55°C | | 2.8 | | A |
| | | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse, 25°C | | 2.5 | | A |
| | | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse, 225°C | | 1.9 | | A |

¹ Includes ESD diode leakage current.

² Voltage for which the cut-off current evolution versus V_{DS} becomes exponential.

Electrical characteristics of CHT-PMOS3004

DC Characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$. **Bold** figures point out values valid over the whole temperature range ($T_j = -55^\circ\text{C}$ to $+225^\circ\text{C}$).

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|--|------------|---|-------------|------|-------------|----------|
| Threshold voltage | V_{TH} | $V_{DS} = -50\text{mV}$ | -0.8 | -1.2 | -1.4 | V |
| Drain cut-off current | I_{DSS} | $V_{GS} = 0\text{V}, V_{DS} = -30\text{V}$ | | 25 | | nA |
| Gate leakage current ³ | I_{GSS} | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}$ | | 300 | | pA |
| Static drain-to-source resistance | R_{DSon} | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, -55^\circ\text{C}$ | | 0.8 | | Ω |
| | | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 25^\circ\text{C}$ | | 1.1 | | Ω |
| | | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 225^\circ\text{C}$ | | 2 | | Ω |
| Breakdown drain-to-source voltage ⁴ | V_{BRDS} | $V_{GS} = 0\text{V}$ | -30 | | | V |

Dynamic Characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$. **Bold** figures point out values valid over the whole temperature range ($T_j = -55^\circ\text{C}$ to $+225^\circ\text{C}$).

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------|-----------|---|-----|------------|-----|------|
| Input capacitance | C_{ISS} | $V_{GS} = 0\text{V}, \text{DS shorted}$ | | 300 | | pF |
| Output capacitance | C_{OSS} | $V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$ | | 46 | | pF |
| Feedback capacitance | C_{RSS} | $V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$ | | 14 | | pF |

Switching Characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$. **Bold** figures point out values valid over the whole temperature range ($T_j = -55^\circ\text{C}$ to $+225^\circ\text{C}$).

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------|-----------|--|-----|------------|-----|------|
| Turn-on delay time | T_{on} | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | tbd | | ns |
| Rise time | T_R | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | tbd | | ns |
| Turn-off delay time | T_{off} | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | tbd | | ns |
| Fall time | T_F | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | tbd | | ns |
| Drain current | I_D | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse, -55°C | | 5.6 | | A |
| | | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse, 25°C | | 5 | | A |
| | | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse, 225°C | | 3.8 | | A |

³ Includes ESD diode leakage current.

⁴ Voltage for which the cut-off current evolution versus V_{DS} becomes exponential.

Electrical characteristics of CHT-PMOS3008

DC Characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$. **Bold** figures point out values valid over the whole temperature range ($T_j = -55^\circ\text{C}$ to $+225^\circ\text{C}$).

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|--|------------|---|-------------|------|-------------|----------|
| Threshold voltage | V_{TH} | $V_{DS} = -50\text{mV}$ | -0.8 | -1.2 | -1.4 | V |
| Drain cut-off current | I_{DSS} | $V_{GS} = 0\text{V}, V_{DS} = -30\text{V}$ | | 50 | | nA |
| Gate leakage current ⁵ | I_{GSS} | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}$ | | 600 | | pA |
| Static drain-to-source resistance | R_{DSon} | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, -55^\circ\text{C}$ | | 0.4 | | Ω |
| | | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 25^\circ\text{C}$ | | 0.6 | | Ω |
| | | $V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 225^\circ\text{C}$ | | 1 | | Ω |
| Breakdown drain-to-source voltage ⁶ | V_{BRDS} | $V_{GS} = 0\text{V}$ | -30 | | | V |

Dynamic Characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$. **Bold** figures point out values valid over the whole temperature range ($T_j = -55^\circ\text{C}$ to $+225^\circ\text{C}$).

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|----------------------|-----------|---|-----|------------|-----|------|
| Input capacitance | C_{ISS} | $V_{GS} = 0\text{V}, \text{DS shorted}$ | | 600 | | pF |
| Output capacitance | C_{OSS} | $V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$ | | 92 | | pF |
| Feedback capacitance | C_{RSS} | $V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$ | | 28 | | pF |

Switching Characteristics

Unless otherwise stated, $T_j = 25^\circ\text{C}$. **Bold** figures point out values valid over the whole temperature range ($T_j = -55^\circ\text{C}$ to $+225^\circ\text{C}$).

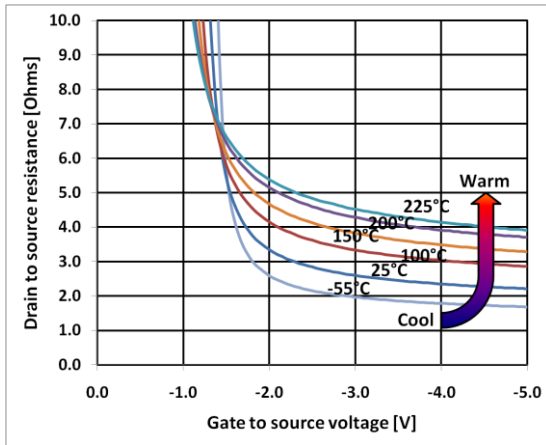
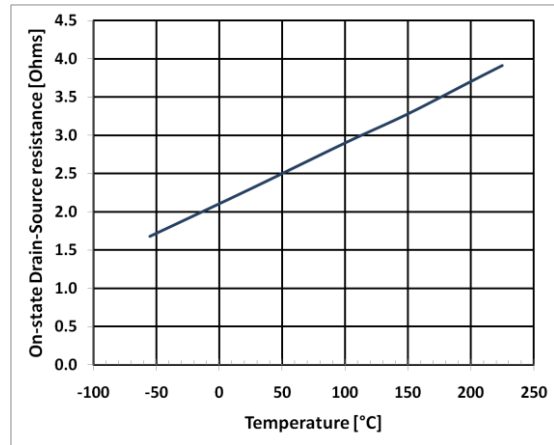
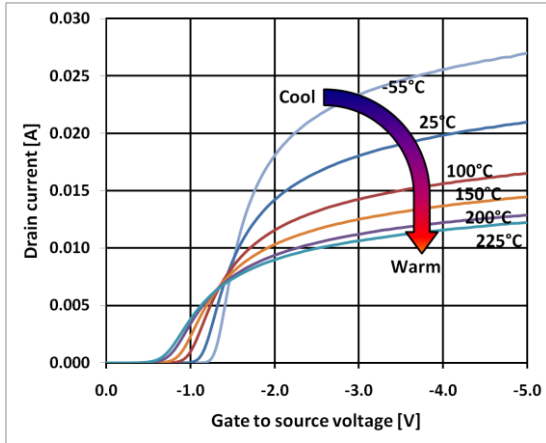
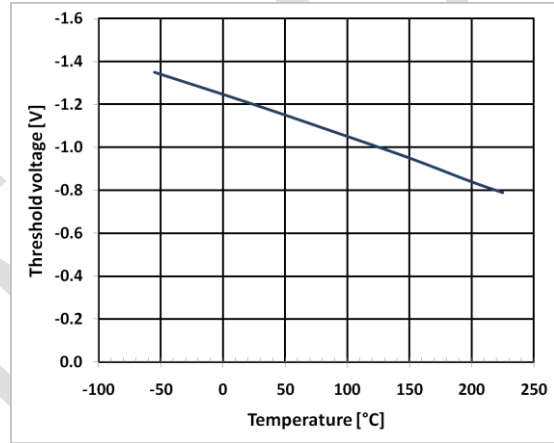
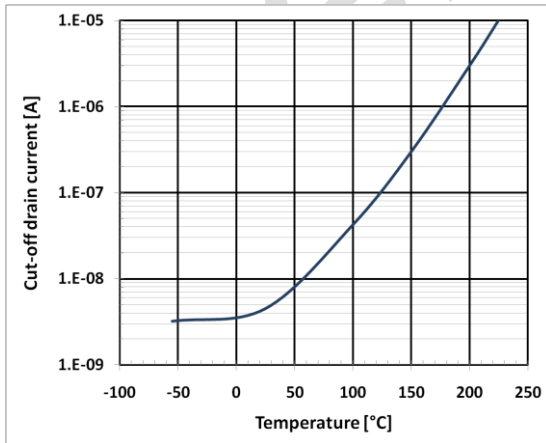
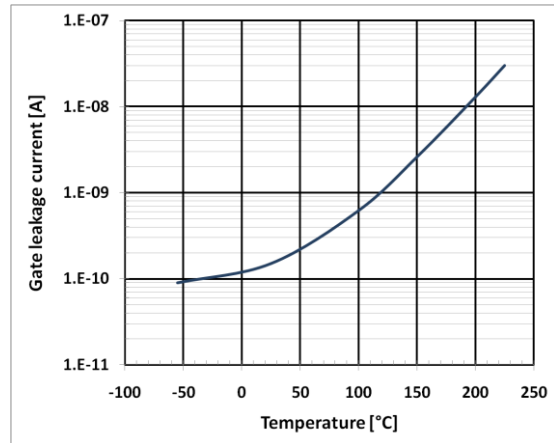
| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---------------------|-----------|--|-----|------------|-----|------|
| Turn-on delay time | T_{on} | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | tbd | | ns |
| Rise time | T_R | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | tbd | | ns |
| Turn-off delay time | T_{off} | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | tbd | | ns |
| Fall time | T_F | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse | | tbd | | ns |
| Drain current | I_D | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse, -55°C | | 11.2 | | A |
| | | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse, 25°C | | 10 | | A |
| | | $V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 μs pulse, 225°C | | 7.6 | | A |

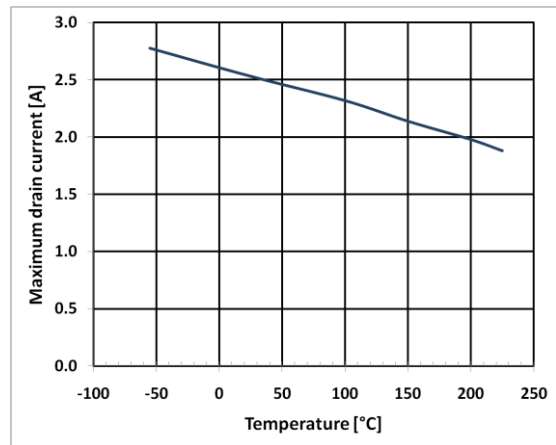
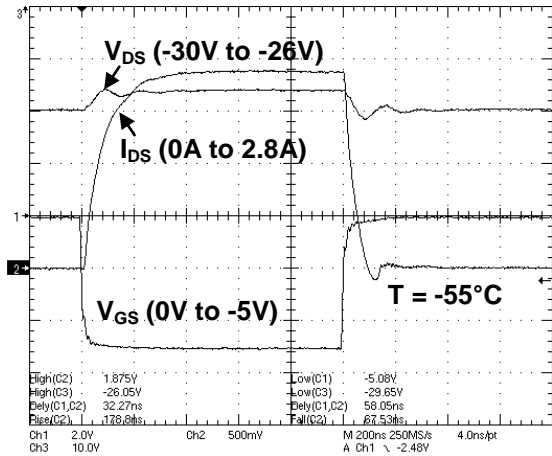
Thermal Characteristics

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---------------|-----------|-----|-----|-----|--------------------|
| Thermal resistance (junction to case, TO-3 or TO-254 packages) | Θ_{JC} | | | 5 | | $^\circ\text{C/W}$ |

⁵ Includes ESD diode leakage current.

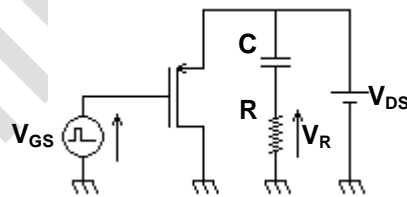
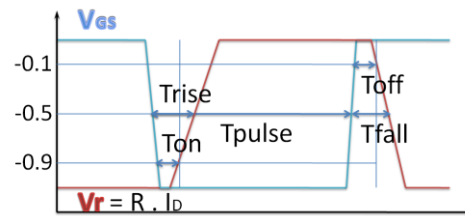
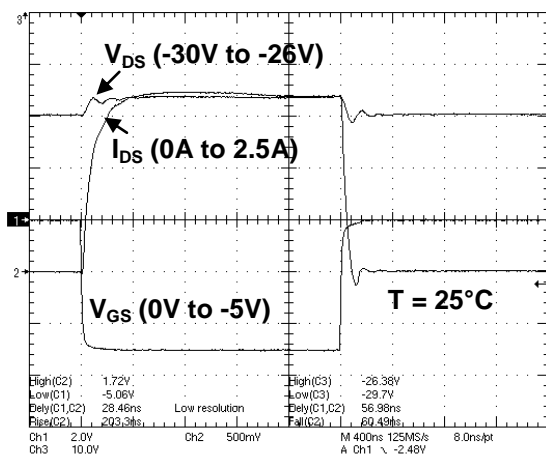
⁶ Voltage for which the cut-off current evolution versus V_{DS} becomes exponential.

Typical Performance Characteristics of CHT-PMOS3002

Drain source resistance vs. drain source voltage
 $(V_D = -50mV)$

On-state drain source resistance vs. temperature
 $(V_G = -5V, V_D = -50mV)$

Drain current vs. gate voltage
 $(V_D = -50mV)$

Threshold voltage vs. temperature

Cut-off current vs. temperature
 $(V_G = 0V, V_D = -30V)$

Gate and ESD diode leakage current vs. temperature
 $(V_G = -5V, V_D = -50mV)$



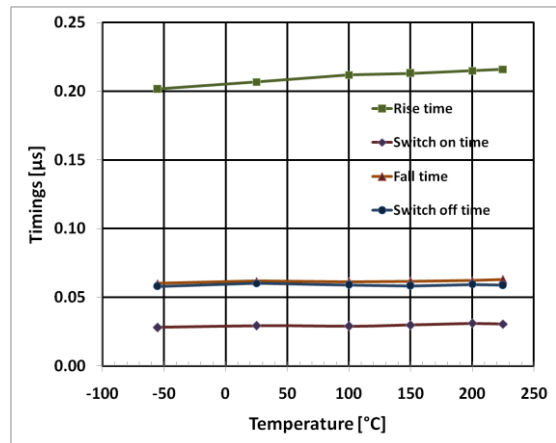
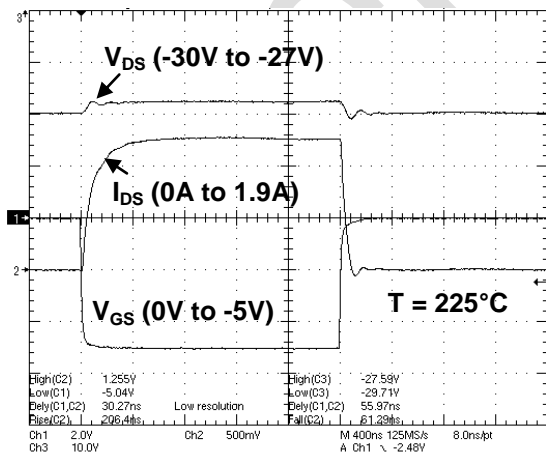
Maximum drain current pulse test (T = -55°C)

Maximum drain current vs. temperature
(V_G = -5V, V_D = -30V)



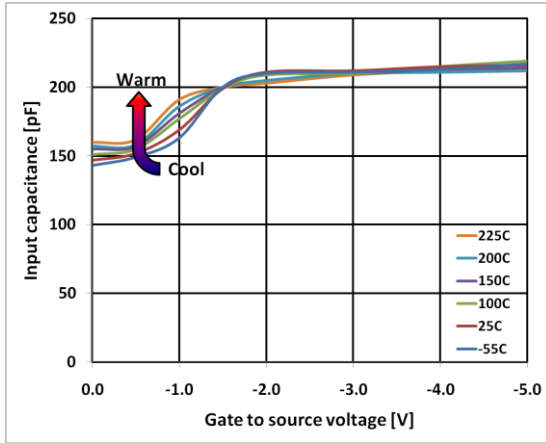
Maximum drain current pulse test (T = 25°C)

Timing diagram and I_{MAX} measurement scheme
R = 0.67Ω, C = 33μF, Compliance(V_{DS} = -30V) = 0.2μA

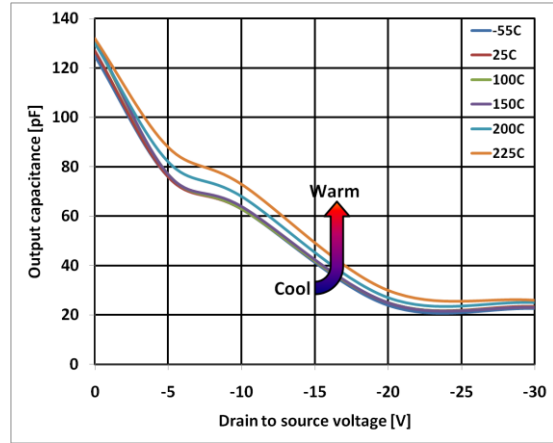


Maximum drain current pulse test (T = 225°C)

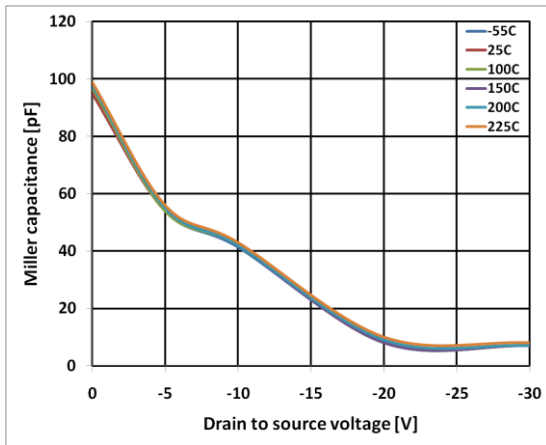
Timing information versus temperature
(V_G = -5V, V_D = -30V)



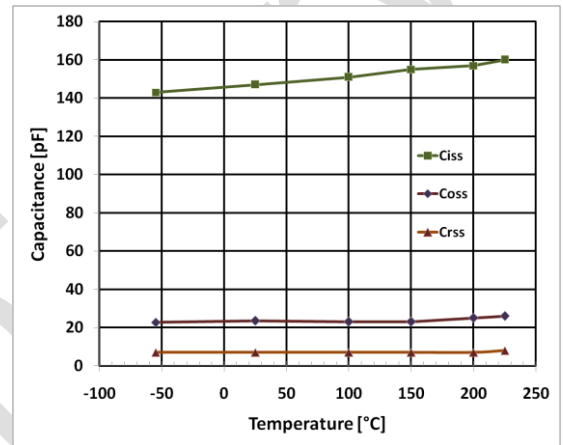
Input capacitance vs. gate to source voltage
($V_{DS} = 0V$, $F = 200kHz$)



Output capacitance vs. drain to source voltage
($V_G = 0V$, $F = 200kHz$)

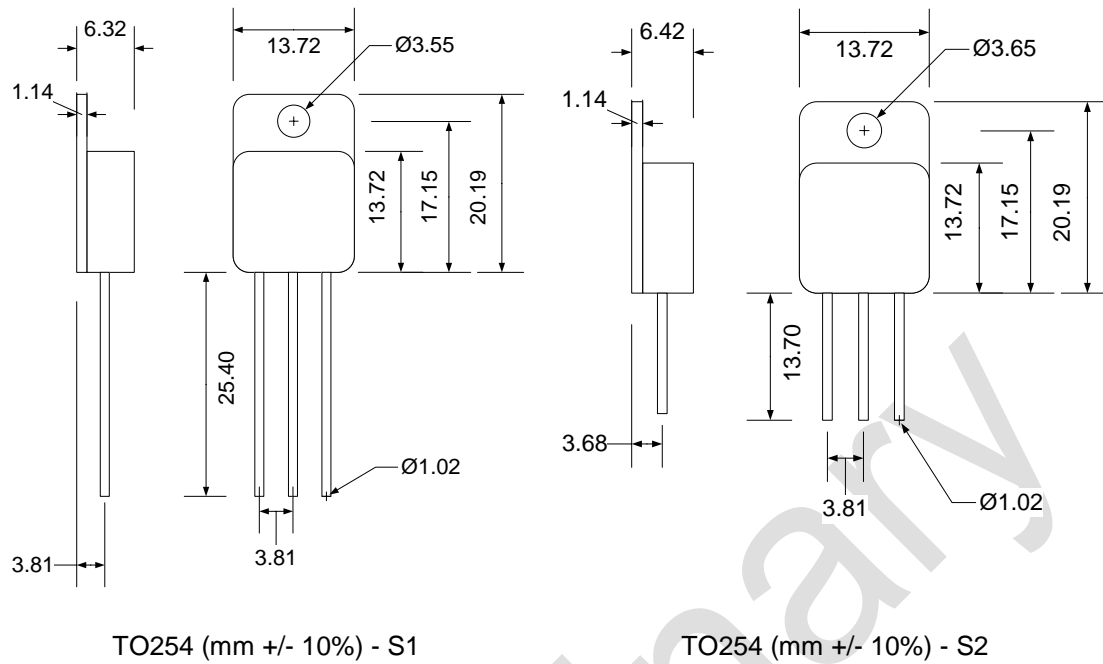


Transfer capacitance vs. drain to source voltage
($V_G = 0V$, $F = 200kHz$)



Parasitic capacitors values vs. temperature

Package Dimensions



Ordering Information

| Ordering Reference | Package | Temperature Range | Marking |
|--------------------------------------|------------------|-------------------|--------------|
| CHT-PMOS3002-TO254-T ⁷ | TO-254 metal can | -55°C to +225°C | CHT-PMOS3002 |
| CHT-PMOS3002-TO254-T-S1 ⁸ | TO-254 metal can | -55°C to +225°C | CHT-PMOS3002 |
| CHT-PMOS3002-TO254-T-S2 ⁹ | TO-254 metal can | -55°C to +225°C | CHT-PMOS3002 |
| CHT-PMOS3004-TO254-T ⁷ | TO-254 metal can | -55°C to +225°C | CHT-PMOS3004 |
| CHT-PMOS3008-TO254-T ⁷ | TO-254 metal can | -55°C to +225°C | CHT-PMOS3008 |

⁷ S1 or S2 package type will be shipped

⁸ S1 package type will be shipped

⁹ S2 package type will be shipped

Contact & Ordering

CISSOID S.A.

| | |
|---------------------------------------|---|
| Headquarters and contact EMEA: | CISSOID S.A. – Rue Francqui, 3 – 1435 Mont Saint Guibert - Belgium T : +32 10 48 92 10 - F: +32 10 88 98 75 Email: sales@cissoid.com |
| Sales Representatives: | Visit our website: http://www.cissoid.com |

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