

# CHT-PMOS30 PRELIMINARY DATASHEET

Version: 1.4  
26-Mar-15  
(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.

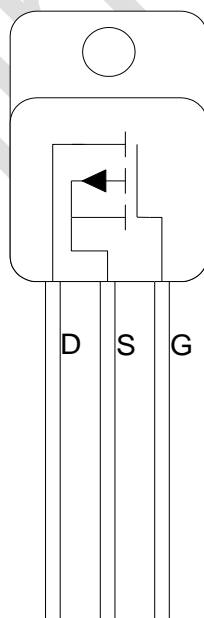
### Applications

- 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 configurations<sup>1</sup>



TO254 (Front view) (Floating case)

<sup>1</sup> 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
DC drain current ( $V_{GS}=5V$ )	
• CHT-PMOS3002:	2A
• CHT-PMOS3004:	4A
• CHT-PMOS3008:	8A
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.*

**Operating Conditions**

Gate-to-Source voltage $V_{GS}$	-5.5V to 0.5V
Drain-to-Source voltage $V_{DS}$	-30V to 0.5V
DC drain current ( $V_{GS}=5V$ )( $TC=175^\circ C$ )	
• CHT-PMOS3002:	1.6A
• CHT-PMOS3004:	2.9A
• CHT-PMOS3008:	5A
Junction temperature	-55°C to +225°C

## 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	$V_{TH}$	$V_{DS} = -50\text{mV}$	<b>-0.8</b>	-1.2	<b>-1.4</b>	V
Drain cut-off current	$I_{DSS}$	$V_{GS} = 0\text{V}, V_{DS} = -30\text{V}$		<b>13</b>		nA
Gate leakage current <sup>1</sup>	$I_{GSS}$	$V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}$		<b>150</b>		pA
Static drain-to-source resistance	$R_{DSon}$	$V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, -55^\circ\text{C}$		<b>1.7</b>		$\Omega$
		$V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 25^\circ\text{C}$		<b>2.3</b>		$\Omega$
		$V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 225^\circ\text{C}$		<b>3.9</b>		$\Omega$
Breakdown drain-to-source voltage <sup>2</sup>	$V_{BRDS}$	$V_{GS} = 0\text{V}$	<b>-30</b>			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	$C_{ISS}$	$V_{GS} = 0\text{V}, \text{DS shorted}$		<b>150</b>		pF
Output capacitance	$C_{OSS}$	$V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$		<b>23</b>		pF
Feedback capacitance	$C_{RSS}$	$V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$		<b>7</b>		pF
Gate to Source Charge	$Q_{GS}$	$V_{GS} = [5 \rightarrow 0]\text{V}; V_D = 30\text{V}$		<b>2.2</b>		nC

### 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 $\mu\text{s}$ pulse		<b>30</b>		ns
Rise time	$T_R$	$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse		<b>200</b>		ns
Turn-off delay time	$T_{off}$	$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse		<b>60</b>		ns
Fall time	$T_F$	$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse		<b>60</b>		ns
Drain current	$I_D$	$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse, $-55^\circ\text{C}$		<b>2.8</b>		A
		$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse, $25^\circ\text{C}$		<b>2.5</b>		A
		$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse, $225^\circ\text{C}$		<b>1.9</b>		A

<sup>1</sup> Includes ESD diode leakage current.

<sup>2</sup> 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	$V_{TH}$	$V_{DS} = -50\text{mV}$	<b>-0.8</b>	-1.2	<b>-1.4</b>	V
Drain cut-off current	$I_{DSS}$	$V_{GS} = 0\text{V}, V_{DS} = -30\text{V}$		25		nA
Gate leakage current <sup>3</sup>	$I_{GSS}$	$V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}$		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		$\Omega$
		$V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 25^\circ\text{C}$		1.1		$\Omega$
		$V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 225^\circ\text{C}$		2		$\Omega$
Breakdown drain-to-source voltage <sup>4</sup>	$V_{BRDS}$	$V_{GS} = 0\text{V}$	<b>-30</b>			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	$C_{ISS}$	$V_{GS} = 0\text{V}, \text{DS shorted}$		<b>300</b>		pF
Output capacitance	$C_{OSS}$	$V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$		<b>46</b>		pF
Feedback capacitance	$C_{RSS}$	$V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$		<b>14</b>		pF
Gate to Source Charge	$Q_{GS}$	$V_{GS} = [5 \rightarrow 0]\text{V}; V_D = 30\text{V}$		4.4		nC

### 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 $\mu\text{s}$ pulse		<b>tbd</b>		ns
Rise time	$T_R$	$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse		<b>tbd</b>		ns
Turn-off delay time	$T_{off}$	$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse		<b>tbd</b>		ns
Fall time	$T_F$	$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse		<b>tbd</b>		ns
Drain current	$I_D$	$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse, $-55^\circ\text{C}$		5.6		A
		$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse, $25^\circ\text{C}$		5		A
		$V_{DS} = -30\text{V}, V_{GS} = -5\text{V}$ 2 $\mu\text{s}$ pulse, $225^\circ\text{C}$		3.8		A

<sup>3</sup> Includes ESD diode leakage current.

<sup>4</sup> 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	$V_{TH}$	$V_{DS} = -50\text{mV}$	<b>-0.8</b>	-1.2	<b>-1.4</b>	V
Drain cut-off current	$I_{DSS}$	$V_{GS} = 0\text{V}, V_{DS} = -30\text{V}$		50		nA
Gate leakage current <sup>5</sup>	$I_{GSS}$	$V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}$		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		$\Omega$
		$V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 25^\circ\text{C}$		0.6		$\Omega$
		$V_{GS} = -5\text{V}, V_{DS} = -50\text{mV}, 225^\circ\text{C}$		1		$\Omega$
Breakdown drain-to-source voltage <sup>6</sup>	$V_{BRDS}$	$V_{GS} = 0\text{V}$	<b>-30</b>			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	$C_{ISS}$	$V_{GS} = 0\text{V}, \text{DS shorted}$		<b>600</b>		pF
Output capacitance	$C_{OSS}$	$V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$		<b>92</b>		pF
Feedback capacitance	$C_{RSS}$	$V_{GS} = 0\text{V}, V_{DS} = -5\text{V}$		<b>28</b>		pF
Gate to Source Charge	$Q_{GS}$	$V_{GS} = [5 \rightarrow 0]\text{V}; V_D = 30\text{V}$		8.8		nC

### 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  $+225^\circ\text{C}$ ).

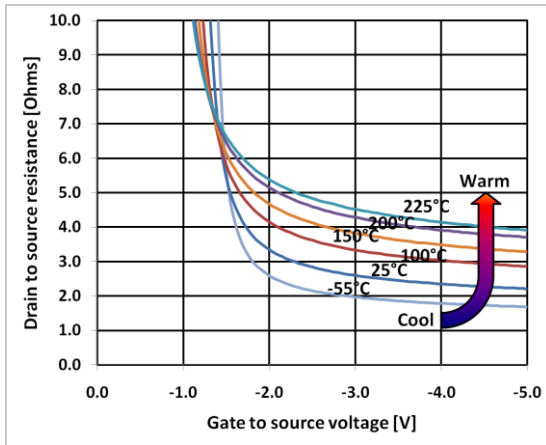
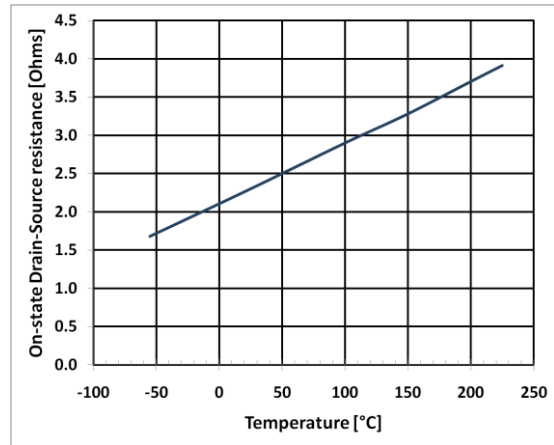
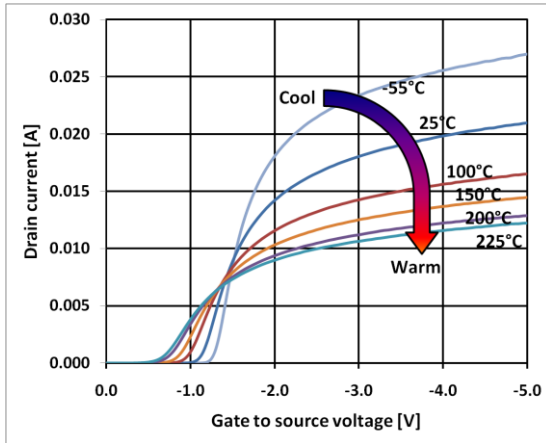
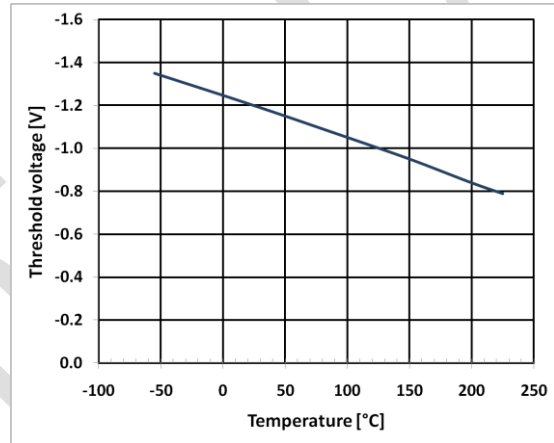
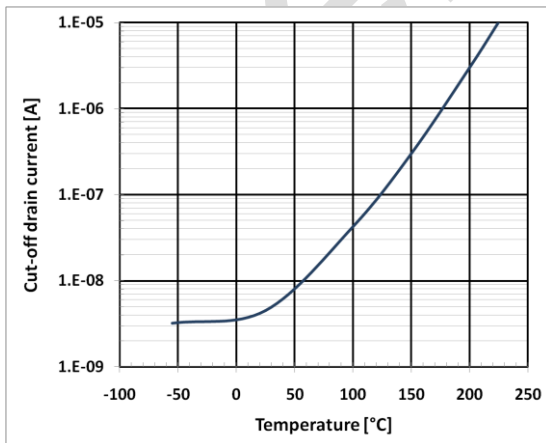
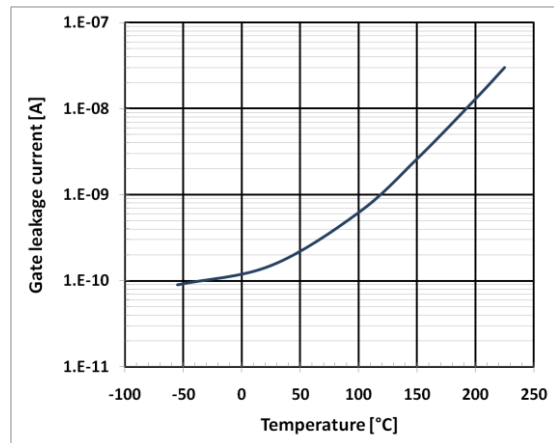
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Turn-on delay time	$T_{on}$	$V_{DS} = -30\text{V}, V_{GS} = -5\text{V} 2\mu\text{s pulse}$		<b>tbd</b>		ns
Rise time	$T_R$	$V_{DS} = -30\text{V}, V_{GS} = -5\text{V} 2\mu\text{s pulse}$		<b>tbd</b>		ns
Turn-off delay time	$T_{off}$	$V_{DS} = -30\text{V}, V_{GS}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

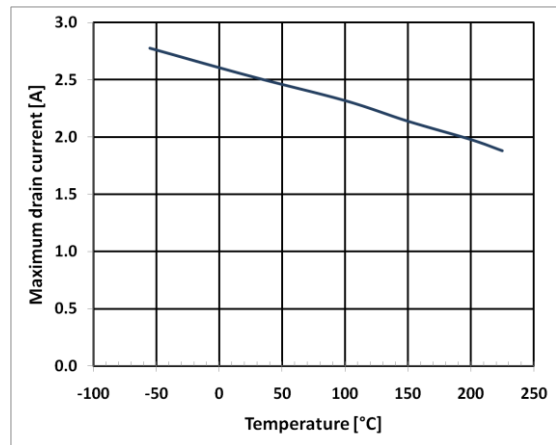
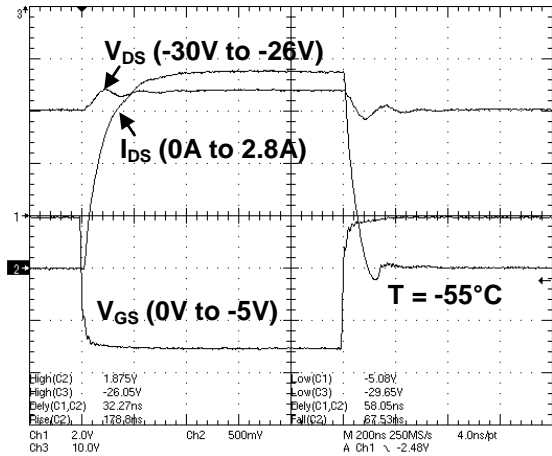
### Thermal Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Thermal resistance (junction to case, TO-254 package) CHT-PMOS3002 CHT-PMOS3004 CHT-PMOS3008	$\Theta_{JC}$			5 3 2		$^\circ\text{C/W}$

<sup>5</sup> Includes ESD diode leakage current.

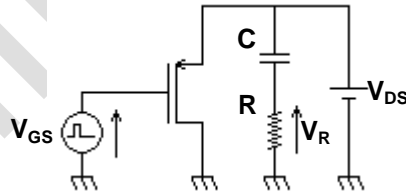
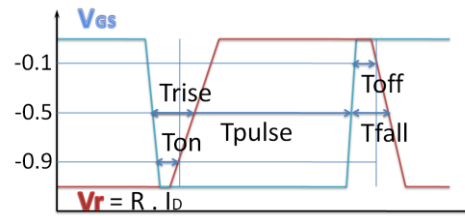
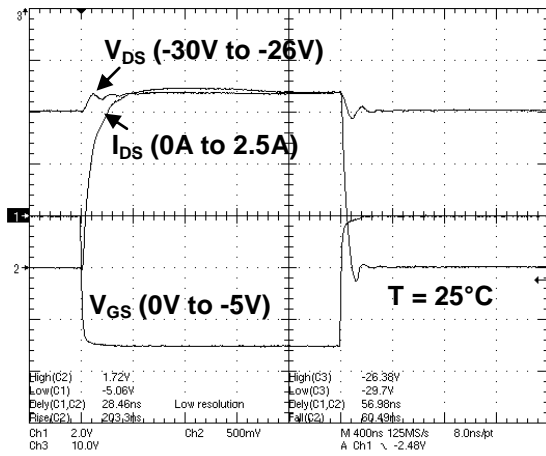
<sup>6</sup> Voltage for which the cut-off current evolution versus  $V_{DS}$  becomes exponential.

**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**  
 $(V_G = -5V, V_D = -50mV)$



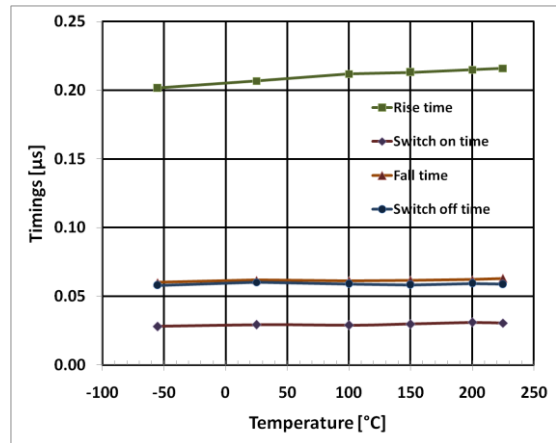
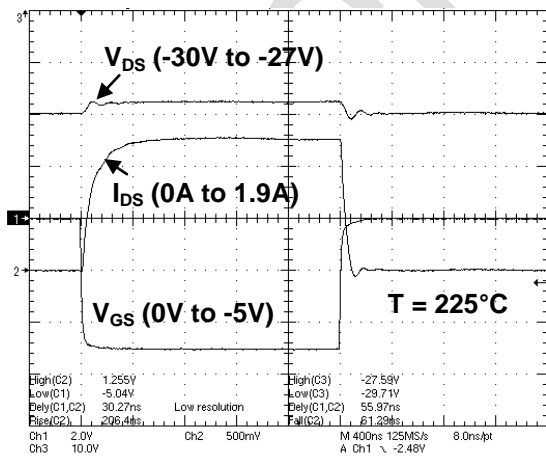
Maximum drain current pulse test (T = -55°C)

Maximum drain current vs. temperature (V<sub>G</sub> = -5V, V<sub>D</sub> = -30V)



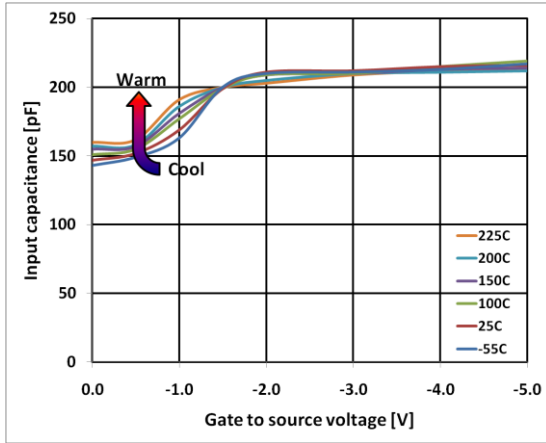
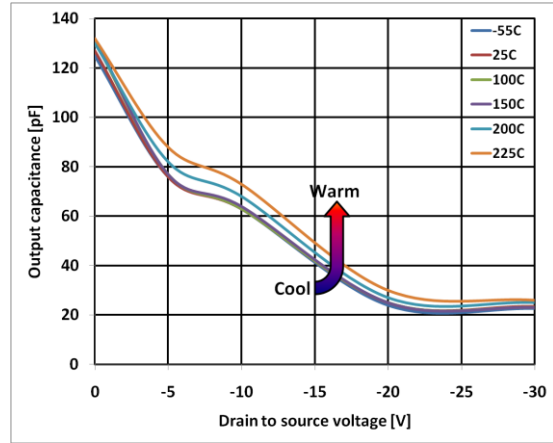
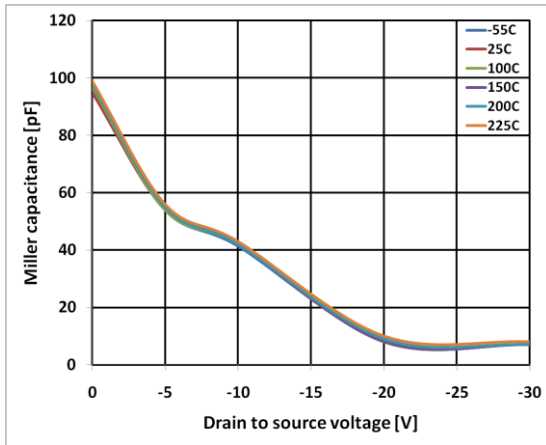
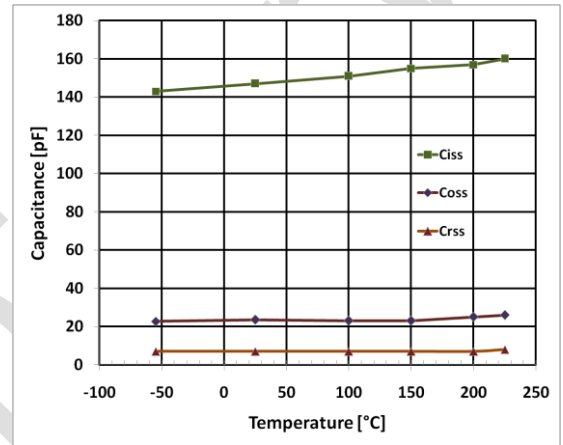
Maximum drain current pulse test (T = 25°C)

Timing diagram and I<sub>MAX</sub> measurement scheme  
R = 0.67Ω, C = 33μF, Compliance(V<sub>DS</sub> = -30V) = 0.2μA



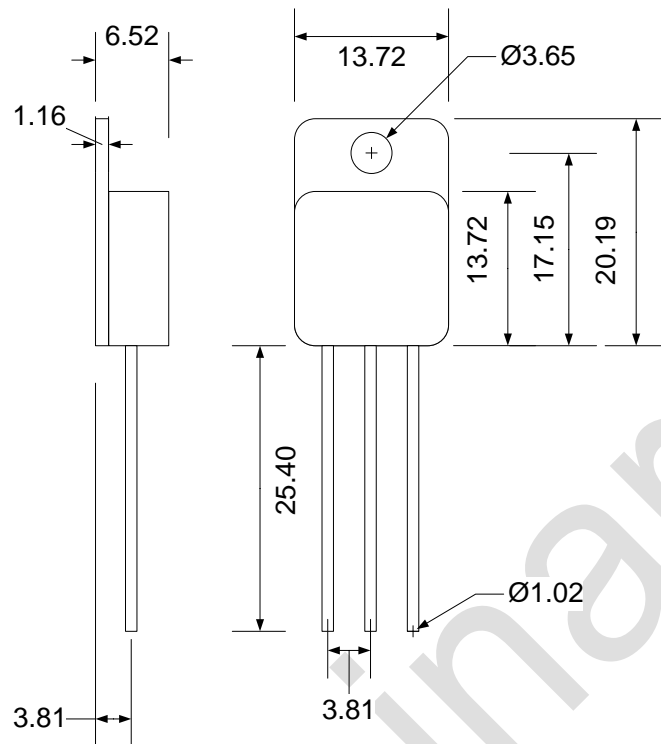
Maximum drain current pulse test (T = 225°C)

Timing information versus temperature (V<sub>G</sub> = -5V, V<sub>D</sub> = -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



TO254 (mm +/- 10%)

## Ordering Information

Ordering Reference	Package	Temperature Range	Marking
CHT-PMOS3002-TO254-T	TO-254 metal can	-55°C to +225°C	CHT-PMOS3002
CHT-PMOS3004-TO254-T	TO-254 metal can	-55°C to +225°C	CHT-PMOS3004
CHT-PMOS3008-TO254-T	TO-254 metal can	-55°C to +225°C	CHT-PMOS3008

## Contact & Ordering

### CISSOID S.A.

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