CHT-PMOS30XX FAMILY
PRELIMINARY DATASHEET

Version: 1.6
14-Dec-23
(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.

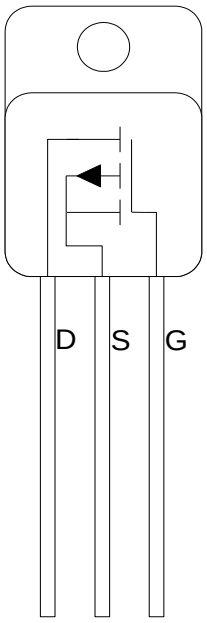
Applications

- 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[1]



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} (Tpulse ≤ 2µs)

- 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°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°C. **Bold** figures point out values valid over the whole temperature range (T_j = -55°C to +225°C).

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

Dynamic Characteristics

Unless otherwise stated, T_j = 25°C. **Bold** figures point out values valid over the whole temperature range (T_j = -55°C to +225°C).

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input capacitance	C_{ISS}	V_{GS} = 0V, DS shorted		**150**		pF
Output capacitance	C_{OSS}	V_{GS} = 0V, V_{DS} = -5V		**23**		pF
Feedback capacitance	C_{RSS}	V_{GS} = 0V, V_{DS} = -5V		**7**		pF
Gate to Source Charge	Q_{GS}	V_{GS} = [5->0]V; VD = 30V		2.2		nC

Switching Characteristics

Unless otherwise stated, T_j = 25°C. **Bold** figures point out values valid over the whole temperature range (T_j = -55°C to +225°C).

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Turn-on delay time	T_{on}	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**30**		ns
Rise time	T_R	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**200**		ns
Turn-off delay time	T_{off}	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**60**		ns
Fall time	T_F	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**60**		ns
Drain current	I_D	V_{DS} = -30V, V_{GS} = -5V 2µs pulse, -55°C		2.8		A
		V_{DS} = -30V, V_{GS} = -5V 2µs pulse, 25°C		2.5		A
		V_{DS} = -30V, V_{GS} = -5V 2µs 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°C. **Bold** figures point out values valid over the whole temperature range (T_j = -55°C to +225°C).

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

Dynamic Characteristics

Unless otherwise stated, T_j = 25°C. **Bold** figures point out values valid over the whole temperature range (T_j = -55°C to +225°C).

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input capacitance	C_{ISS}	V_{GS} = 0V, DS shorted		**300**		pF
Output capacitance	C_{OSS}	V_{GS} = 0V, V_{DS} = -5V		**46**		pF
Feedback capacitance	C_{RSS}	V_{GS} = 0V, V_{DS} = -5V		**14**		pF
Gate to Source Charge	Q_{GS}	V_{GS} = [5->0]V; VD = 30V		4.4		nC

Switching Characteristics

Unless otherwise stated, T_j = 25°C. **Bold** figures point out values valid over the whole temperature range (T_j = -55°C to +225°C).

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Turn-on delay time	T_{on}	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**tbd**		ns
Rise time	T_R	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**tbd**		ns
Turn-off delay time	T_{off}	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**tbd**		ns
Fall time	T_F	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**tbd**		ns
Drain current	I_D	V_{DS} = -30V, V_{GS} = -5V 2µs pulse, -55°C		5.6		A
		V_{DS} = -30V, V_{GS} = -5V 2µs pulse, 25°C		5		A
		V_{DS} = -30V, V_{GS} = -5V 2µs 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°C. **Bold** figures point out values valid over the whole temperature range (T_j = -55°C to +225°C).

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

Dynamic Characteristics

Unless otherwise stated, T_j = 25°C. **Bold** figures point out values valid over the whole temperature range (T_j = -55°C to +225°C).

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input capacitance	C_{ISS}	V_{GS} = 0V, DS shorted		**600**		pF
Output capacitance	C_{OSS}	V_{GS} = 0V, V_{DS} = -5V		**92**		pF
Feedback capacitance	C_{RSS}	V_{GS} = 0V, V_{DS} = -5V		**28**		pF
Gate to Source Charge	Q_{GS}	V_{GS} = [5->0]V; VD = 30V		8.8		nC

Switching Characteristics

Unless otherwise stated, T_j = 25°C. **Bold** figures point out values valid over the whole temperature range (T_j = -55°C to +225°C).

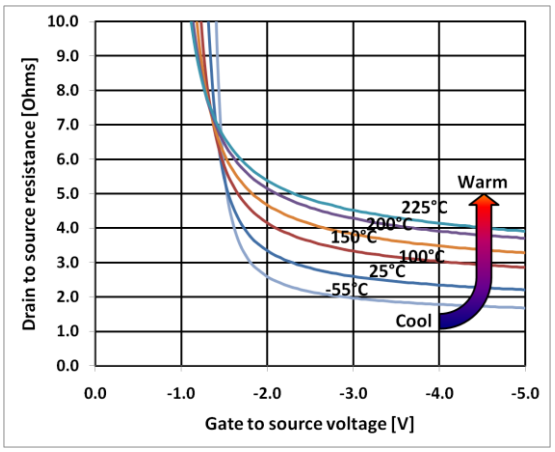
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Turn-on delay time	T_{on}	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**tbd**		ns
Rise time	T_R	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**tbd**		ns
Turn-off delay time	T_{off}	V_{DS} = -30V, V_{GS} = -5V 2µs pulse		**tbd**		ns
Fall time	T_F	V_{DS} = -30V, V_{GS}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

Thermal Characteristics

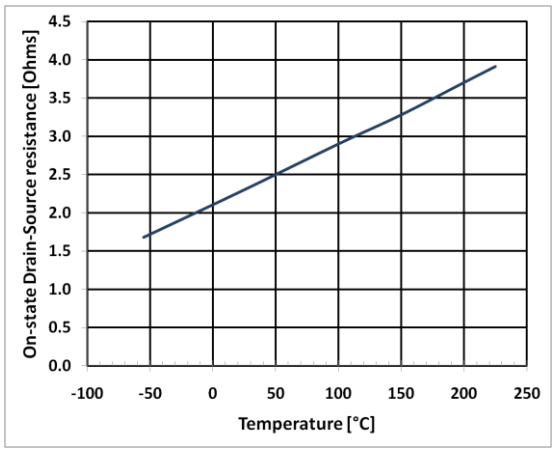
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Thermal resistance (junction to case, TO-254 package) CHT-PMOS3002 CHT-PMOS3004 CHT-PMOS3008	Θ_{JC}			 5 3 2		°C/W

[5] Includes ESD diode leakage current.
[6] Voltage for which the cut-off current evolution versus V_{DS} becomes exponential.

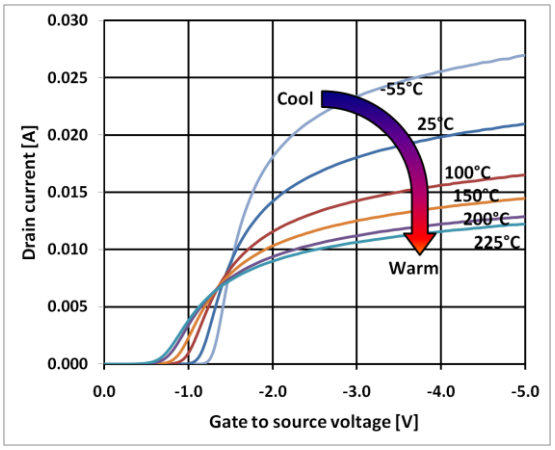
Typical Performance Characteristics of CHT-PMOS3002



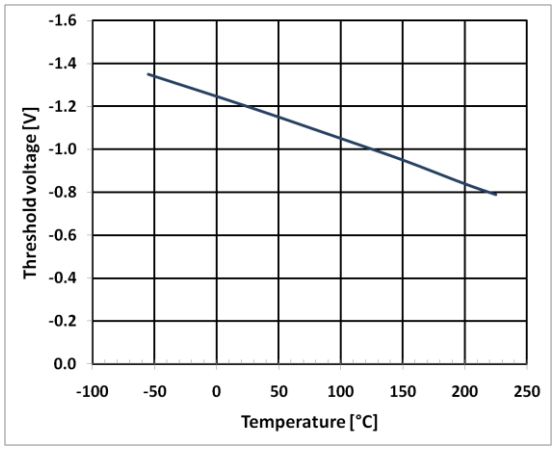
Drain source resistance vs. drain source voltage (V_D = -50mV)



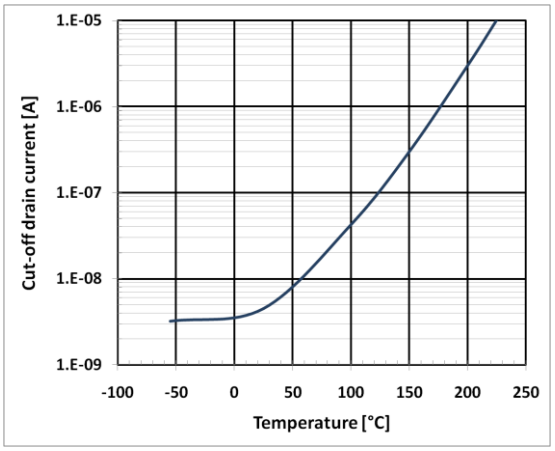
On-state drain source resistance vs. temperature (V_G = -5V, V_D = -50mV)



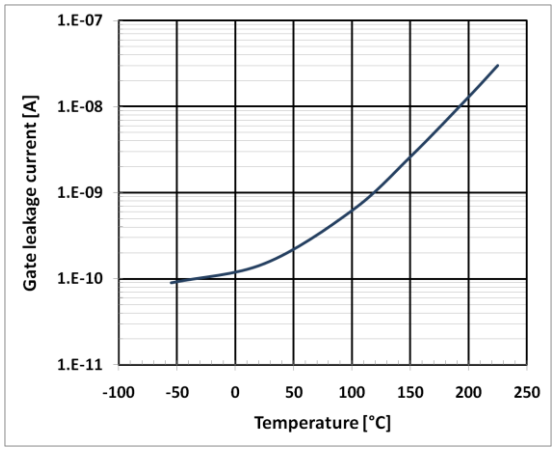
Drain current vs. gate voltage (V_D = -50mV)



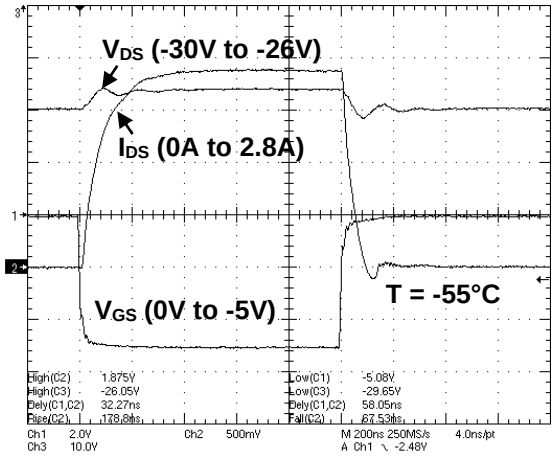
Threshold voltage vs. temperature



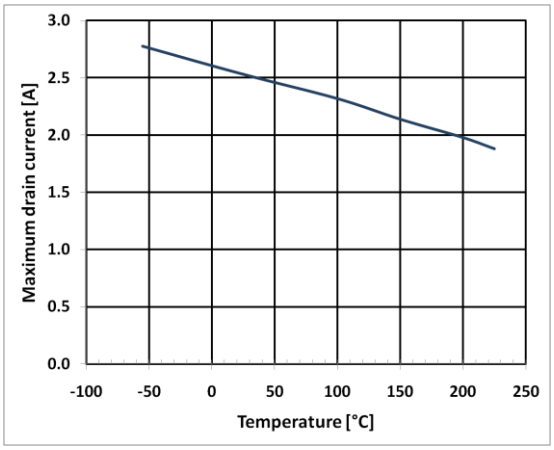
Cut-off current vs. temperature (V_G = 0V, V_D = -30V)



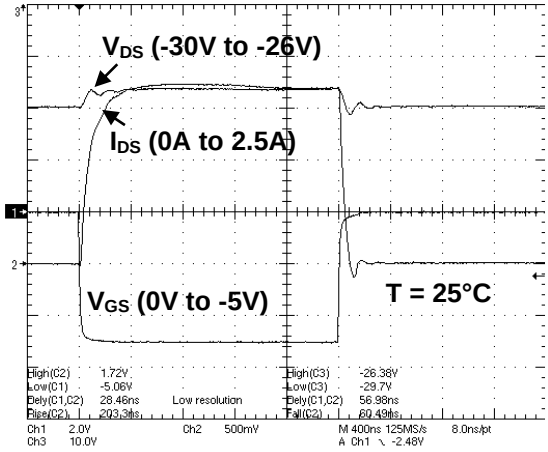
Gate and ESD diode leakage current vs. temperature (V_G = -5V, V_D = -50mV)



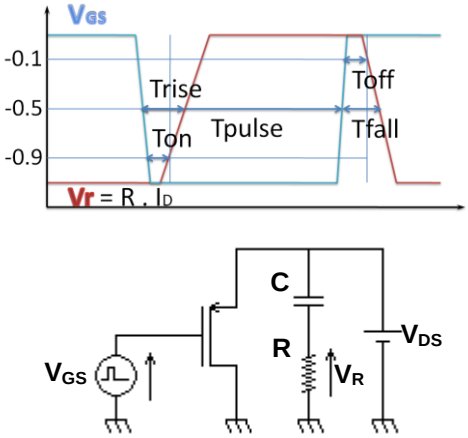
Maximum drain current pulse test (T = -55°C)



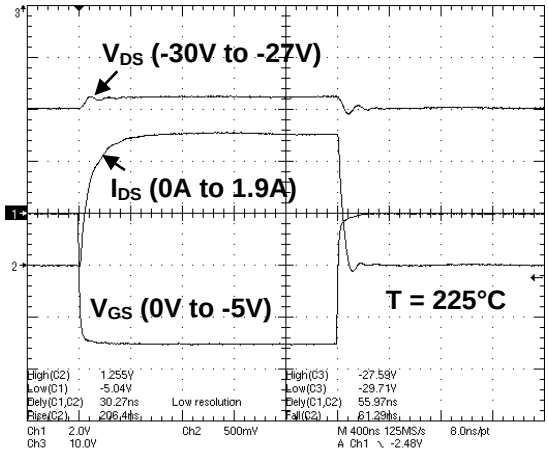
Maximum drain current vs. temperature (V_G = -5V, V_D = -30V)



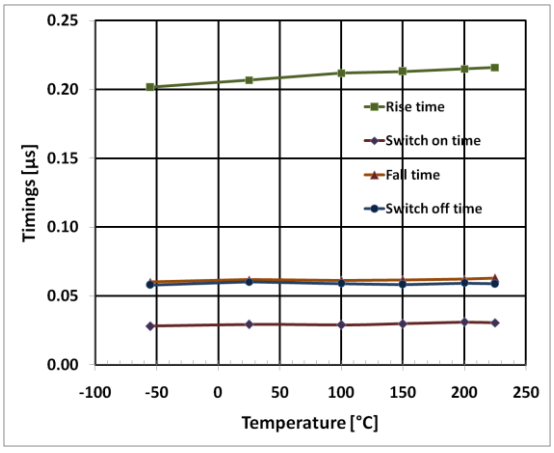
Maximum drain current pulse test (T = 25°C)



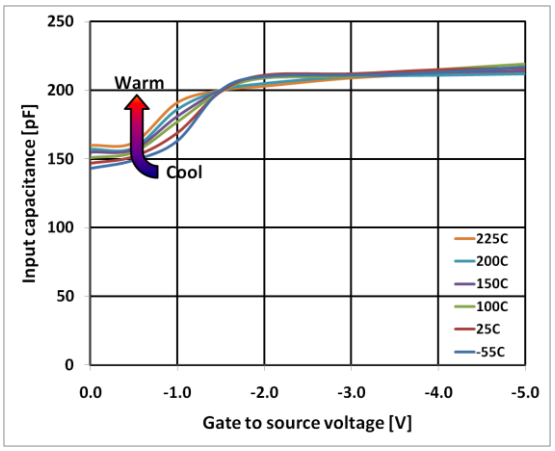
Timing diagram and I_{MAX} measurement scheme R = 0.67Ω, C = 33µF, Compliance(V_{DS} = -30V) = 0.2µA



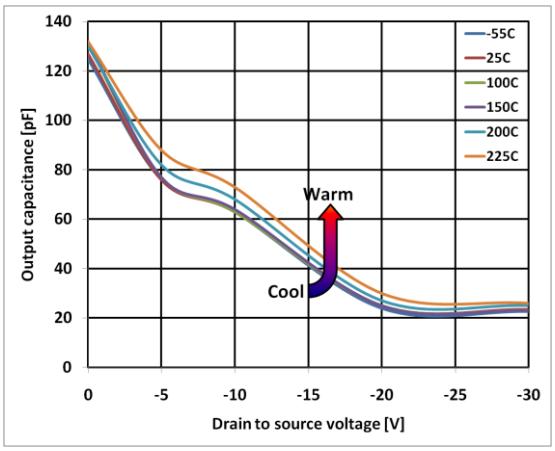
Maximum drain current pulse test (T = 225°C)



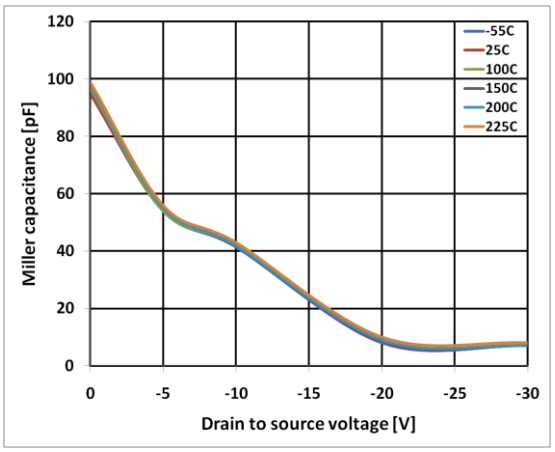
Timing information versus temperature (V_G = -5V, V_D = -30V)



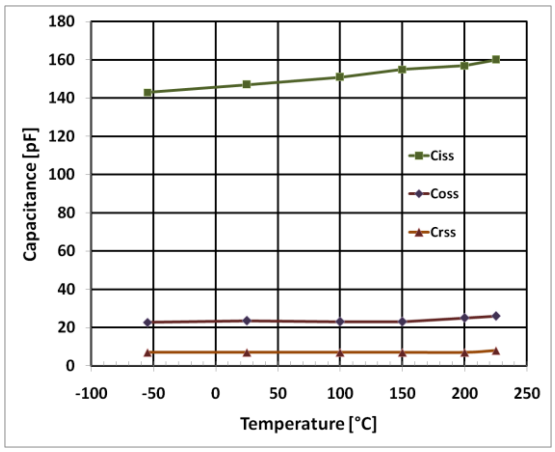
Input capacitance vs. gate to source voltage (V_{DS} = 0V, F = 200kHz)



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

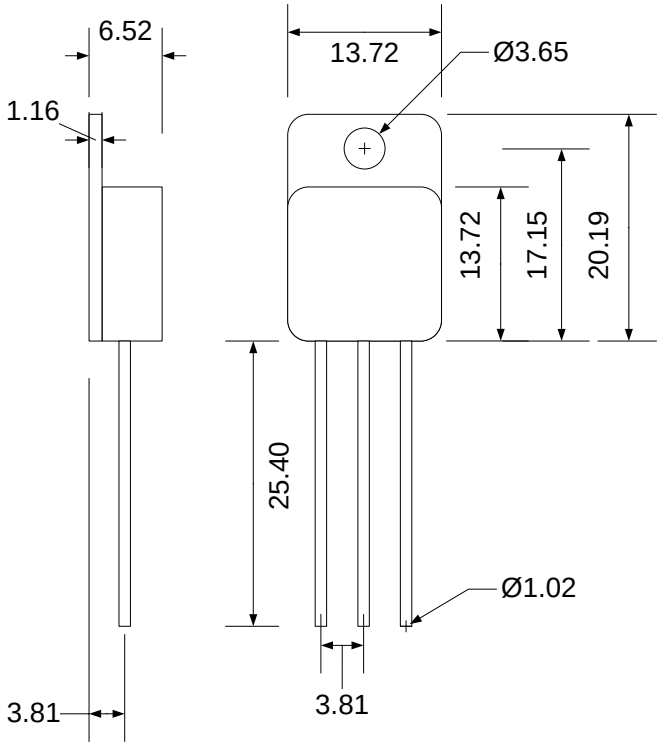


Transfer capacitance vs. drain to source voltage (V_G = 0V, F = 200kHz)



Parasitic capacitors values vs. temperature

Package Dimensions



TO254 (mm +/- 10%)

Ordering Information

Ordering Reference	Package	Temperature Range	Marking	Status
CHT-PMOS3002-TO254-T	TO-254 metal can	-55°C to +225°C	CHT-PMOS3002	Not for new design
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	Not for new design

Contact & Ordering

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