CHT-MARS-DATASHEET

Version: 1.8
5-Mar-15
(Last Modification Date)

High-Temperature Small-signal P-channel MOSFET

General description

The CHT-MARS is a high voltage 30V P-channel small-signal MOSFET designed to achieve high performance in an extremely wide temperature range: typical operation temperature goes from -55°C to 225°C.

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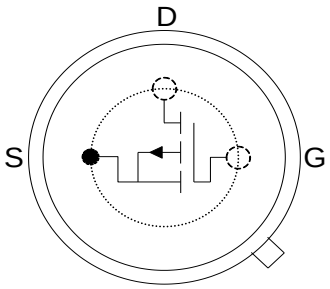
Applications

Sensor interfaces, such as piezoelectric sensor, guard amplifiers, switches of high and medium impedance loads, level-shifters and high temperature diodes.

Features

- Qualified from -55 to +225°C (Tj)
- Operational up to +250°C (Tj)
- Drain voltage up to 30V
- Typ output current 310mA @ 225°C
- R_{DSon} = 26Ω @ 225°C
- VGS = +0.5V to -5.5V
- Validated at 225°C for 1000 hours (and still on-going)
- Available in TO-18 package (other packages available upon request).

Package configurations[1]



TO18 (Top view)
(case connected to source)

[1] Other packages available upon request.

Absolute Maximum Ratings

Gate-to-Source voltage V_{GS}	+0.5V to -5.5V
Pulsed drain current I_{DS}	480mA @ -55°C
(Tpulse ≤ 2µs)	420mA @ 25°C
	310mA @ 225°C
Junction temperature T_j	300°C

ESD Rating

Human Body Model	CLASS1B

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}	0V to -5V
Drain-to-Source voltage V_{DS}	0V to -30V
Junction temperature	-55°C to +225°C

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Electrical characteristics

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	**-1.3**		**-0.6**	V
Drain cut-off current	I_{DSS}	V_{GS} = 0V, V_{DS} = -30V, T_j=-55°C		1		nA
		V_{GS} = 0V, V_{DS} = -30V, T_j=25°C		5		nA
		V_{GS} = 0V, V_{DS} = -30V, T_j=225°C		10		uA
Gate leakage current[1]	I_{GSS}	V_{GS} = -5V, V_{DS} = -50mV, T_j=-55°C		33		pA
		V_{GS} = -5V, V_{DS} = -50mV, T_j=25°C		100		pA
		V_{GS} = -5V, V_{DS} = -50mV, T_j=225°C		0.4		µA
Static drain-to-source resistance	R_{DSon}	V_{GS} = -5V, V_{DS} = -50mV, T_j=-55°C		12		Ω
		V_{GS} = -5V, V_{DS} = -50mV, T_j=25°C		15		Ω
		V_{GS} = -5V, V_{DS} = -50mV, T_j=225°C		26		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_{DC}, V_{DS}=-25V_{DC}		14		pF
Output capacitance	C_{OSS}	V_{GS} = 0V_{DC}, V_{DS}=-25V_{DC}		3.5		pF
Feedback capacitance	C_{RSS}	V_{GS} = 0V_{DC}, V_{DS}=-25V_{DC}		1.5		pF

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).

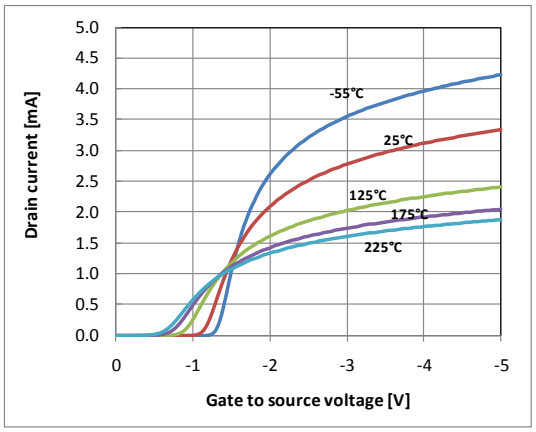
Parameter	Sym-bol	Condition	Min	Typ	Max	Unit
Turn-on delay time	$T_{d(ON)}$	V_{DS} = -15V, V_{GS} = -5V 1µs pulse		**10.1**		ns
Rise time	T_r	V_{DS} = -15V, V_{GS} = -5V 1µs pulse		**13.2**		ns
Turn-off delay time	$T_{d(OFF)}$	V_{DS} = -15V, V_{GS} = -5V 1µs pulse		**10.9**		ns
Fall time	T_F	V_{DS} = -15V, V_{GS} = -5V 1µs pulse		**17.2**		ns
Drain current	I_D	V_{DS} = -30V, V_{GS} = -5V 2µs pulse, T_j=-55°C		480		mA
		V_{DS} = -30V, V_{GS} = -5V 2µs pulse, T_j=25°C		420		mA
		V_{DS} = -30V, V_{GS} = -5V 2µs pulse, T_j=225°C		310		mA

Thermal Characteristics

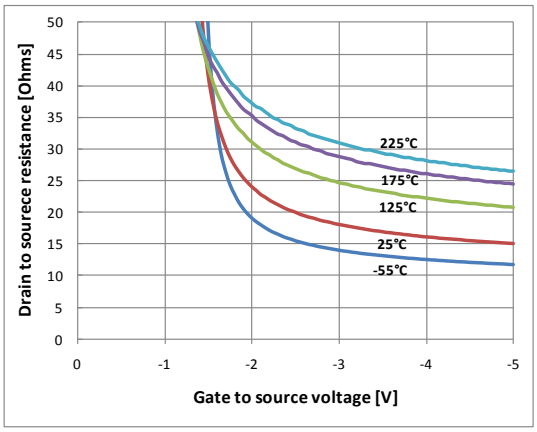
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Thermal resistance (junction to case, TO-18 package)	Θ_{JC}			60		°C/W

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

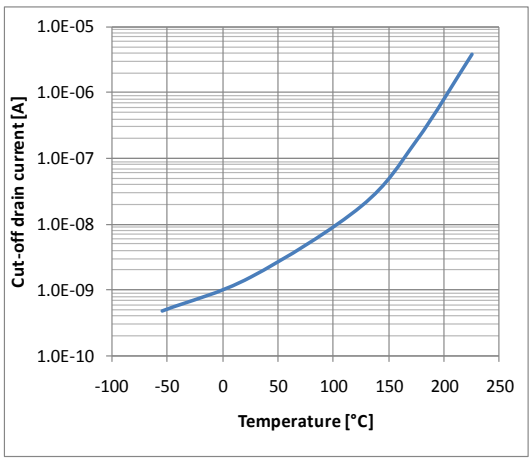
Typical Performance Characteristics



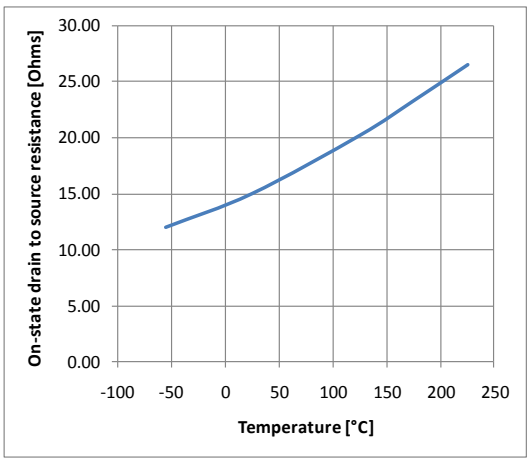
Drain current vs. gate-source voltage (V_D=-50mV).



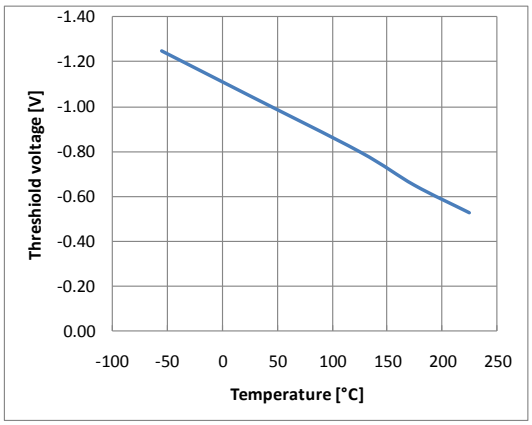
Drain source resistance vs. gate-source voltage (V_D=-50mV).



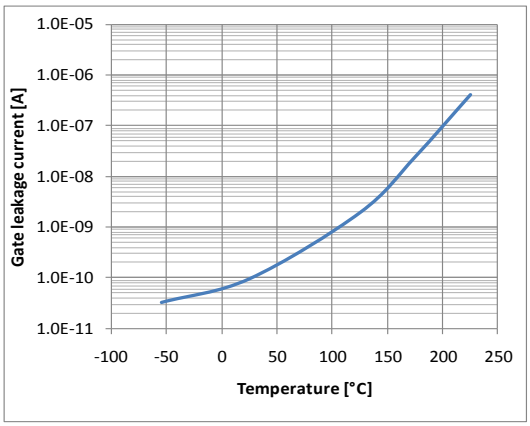
Cut-off drain current vs. temperature (V_G=0V, V_D=-30V).



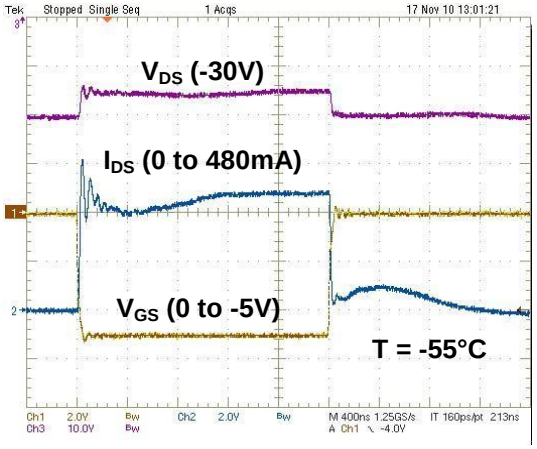
On-state drain source resistance vs. temperature (V_G=-5V, V_D=-50mV).



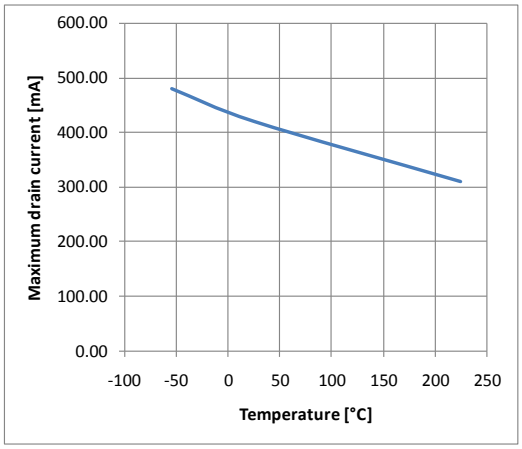
Threshold voltage vs. temperature



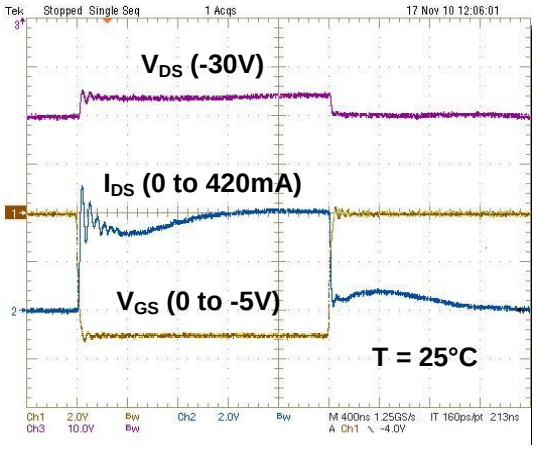
Gate and ESD diode leakage current vs. temperature (V_G=-5V, V_D=-50mV).



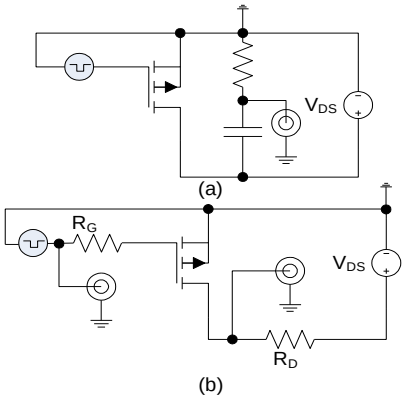
Maximum drain current pulse test (T=-55°C).



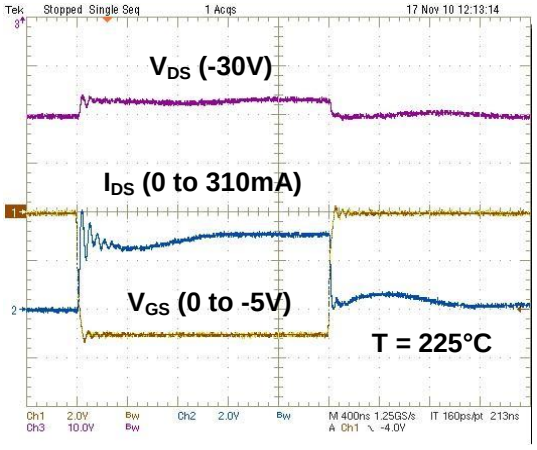
Peak drain current vs. temperature (V_G=-5V, V_D=-30V).



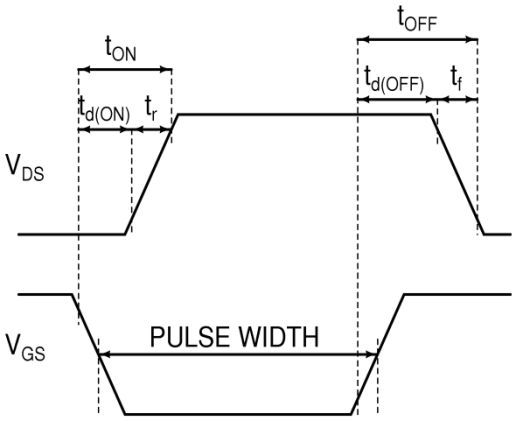
Maximum drain current pulse test (T=25°C).



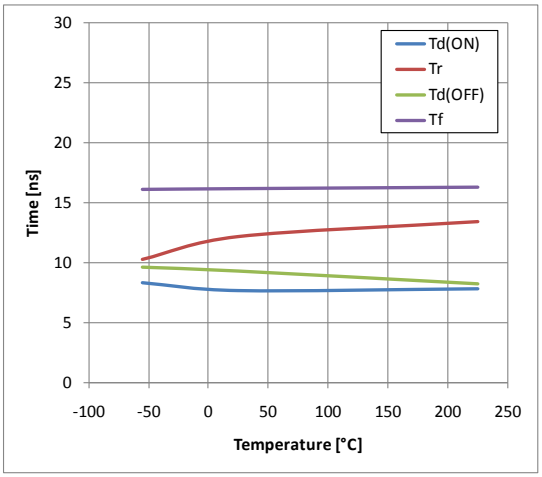
(a) I_D^{MAX} measurement scheme R=10Ω, C=100µF, Compliance (V_{DS}=-30V)=100mA (b) Timing measurement scheme R_G=0Ω, R_D=68Ω, V_{DS}=-15V.



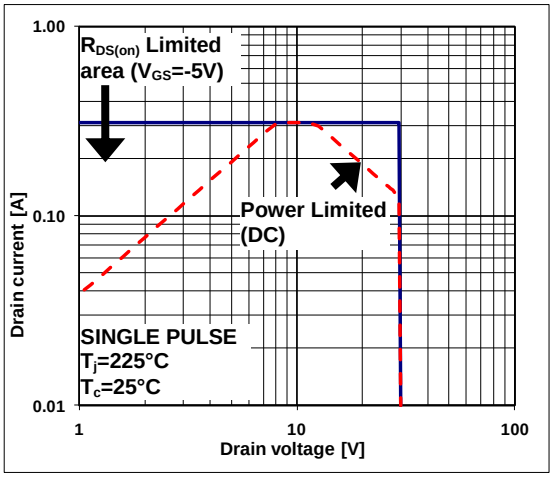
Maximum drain current pulse test (T=225°C).



Timing definition diagram.

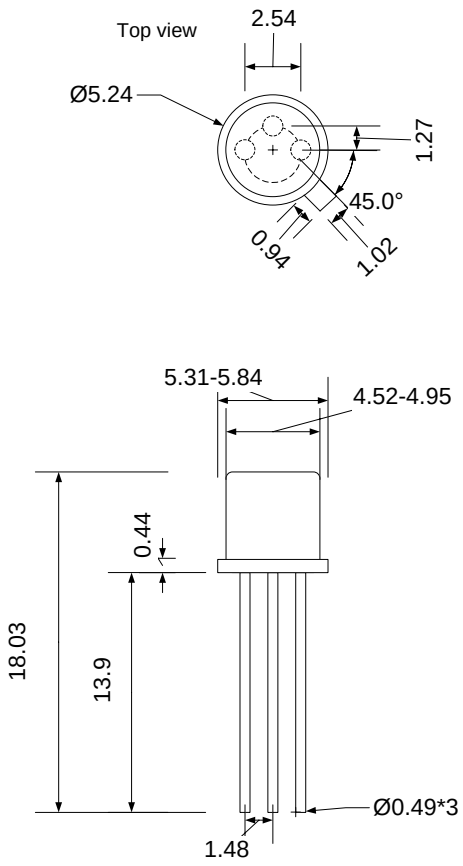


Timing parameters versus temperature.



Forward bias safe operating area

Package Dimensions



TO18 (mm+/-10%)

Ordering Information

Ordering Reference	Package	Temperature Range	Marking
CHT-SPMOS30-TO18-T	TO-18 metal can	-55°C to +225°C	CHT-SP3

Contact & Ordering

CISSOID S.A.

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