MERCURY: CHT-SNMOS80 DATASHEET
High-Temperature Small-signal N-channel MOSFET

Version: 2.6
23-Mar-12
Last Modified Date

General description

The CHT-SNMOS-80 is a high voltage 80V N-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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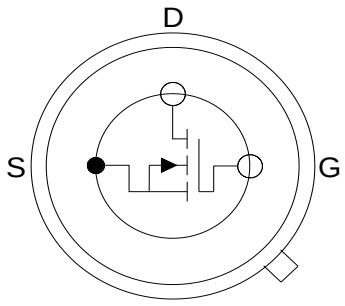
Applications

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)
- Drain voltage up to 80V
- Typ output current 300mA @ 225°C
- R_{DSon} = 15Ω @ 225°C
- VGS = -0.5V to +5.5V
- Reverse ESD diode between gate and source.
- Validated at 225°C for 1000 hours (and still on-going)
- Available in TO39 and TO18 packages (other packages available upon request).

Package configurations[1]



TO39/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}	500mA	@	-55°C
(Tpulse ≤ 2µs)	450mA	@	25°C
	300mA	@	225°C
Power dissipation T_c=25°C			3.75W
Junction temperature T_j			300°C

ESD Rating

Human Body Model	CLASS1C

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 80V
Power dissipation T_c=25°C	3.3W
Junction temperature	-55°C to +225°C

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**	1.65	**1.9**	V
Drain cut-off current	I_{DSS}	V_{GS} = 0V, V_{DS} = 80V, T_j=25°C		5		nA
		V_{GS} = 0V, V_{DS} = 80V, T_j=225°C		4		uA
Gate leakage current[1]	I_{GSS}	V_{GS} = 5V, V_{DS} = 50mV, T_j=25°C		100		pA
		V_{GS} = 5V, V_{DS} = 50mV, T_j=225°C		400		nA
Static drain-to-source resistance	R_{DSon}	V_{GS} = 5V, V_{DS} = 50mV, T_j=-55°C		5.93		Ω
		V_{GS} = 5V, V_{DS} = 50mV, T_j=25°C		7.54		Ω
		V_{GS} = 5V, V_{DS} = 50mV, T_j=225°C		15.22		Ω
Breakdown drain-to-source voltage[2]	V_{BRDS}	V_{GS} = 0V	**80**			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}=$25V_{DC}$		23		pF
Output capacitance	C_{OSS}	V_{GS} = $0V_{DC}$, V_{DS}=$25V_{DC}$		8.6		pF
Feedback capacitance	C_{RSS}	V_{GS} = $0V_{DC}$, V_{DS}=$25V_{DC}$		1.8		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).

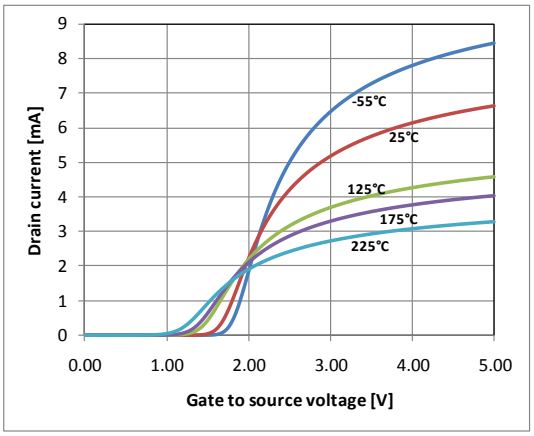
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Turn-on delay time	$T_{d(ON)}$	V_{DS} = 40V, V_{GS} = 5V 1µs pulse		**20**		ns
Rise time	T_r	V_{DS} = 40V, V_{GS} = 5V 1µs pulse		**6.5**		ns
Turn-off delay time	$T_{d(OFF)}$	V_{DS} = 40V, V_{GS} = 5V 1µs pulse		**19**		ns
Fall time	T_F	V_{DS} = 40V, V_{GS} = 5V 1µs pulse		**8.1**		ns
Drain current	I_D	V_{DS} = 80V, V_{GS} = 5V 2µs pulse, T_j=-55°C		500		mA
		V_{DS} = 80V, V_{GS} = 5V 2µs pulse, T_j=25°C		450		mA
		V_{DS} = 80V, V_{GS} = 5V 2µs pulse, T_j=225°C		300		mA

Thermal Characteristics

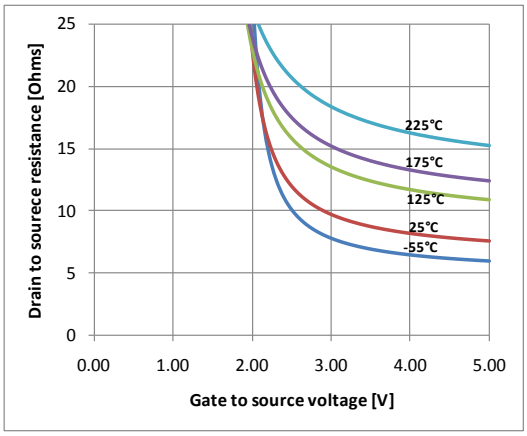
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Thermal resistance (junction to case, TO-39 package)	Θ_{JC}			60		°C/W
Thermal resistance (junction to case, TO-18 package)	Θ_{JC}			60		°C/W

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

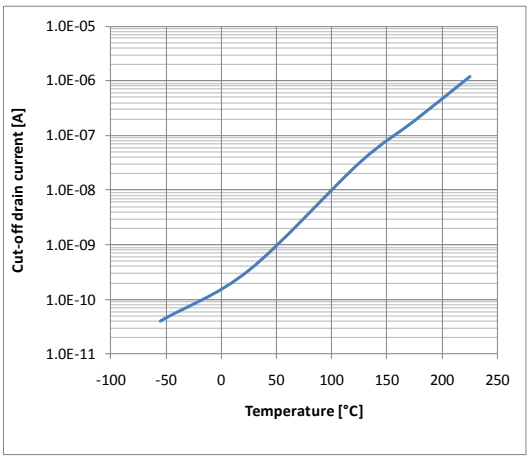
Typical Performance Characteristics



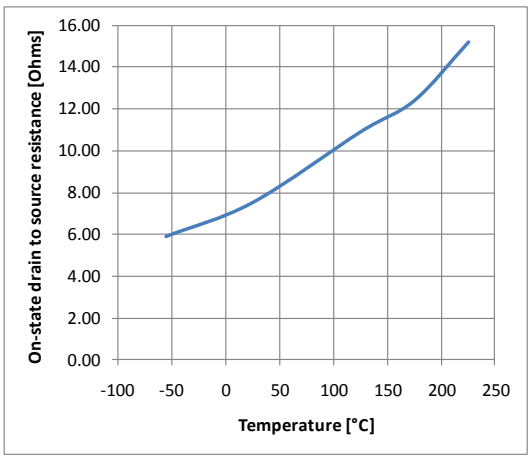
Drain current vs. gate-source voltage (V_D=50mV).



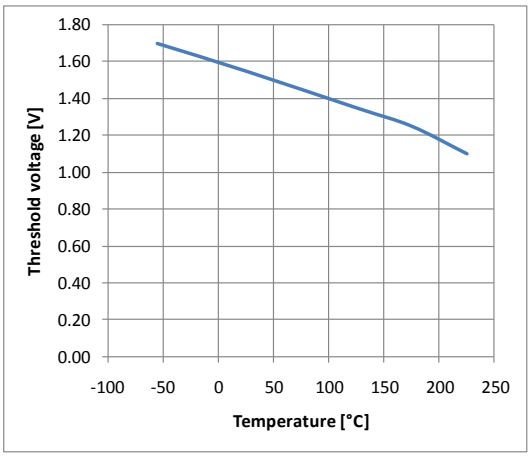
Drain source resistance vs. gate-source voltage (V_D=50mV).



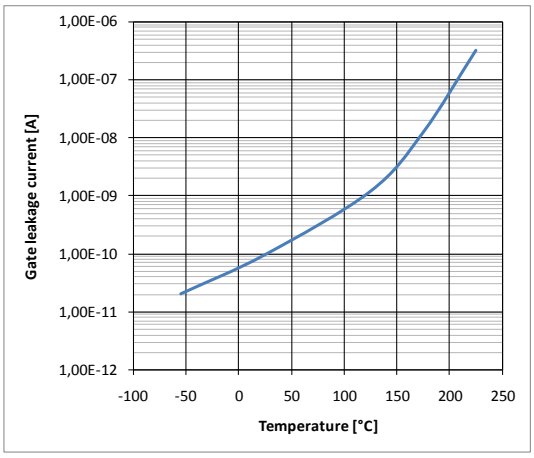
Cut-off drain current vs. temperature (V_G=0V, V_D=80V).



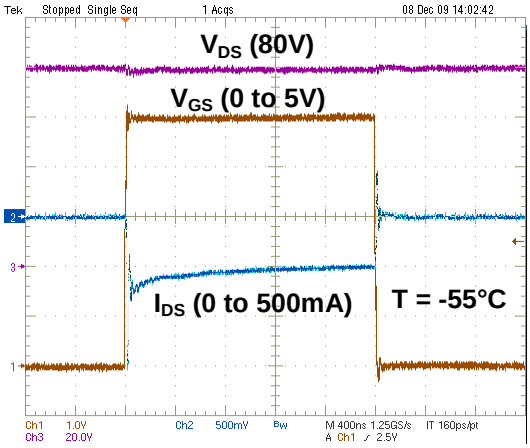
On-state drain source resistance vs. temperature (V_G=5V, V_D=50mV).



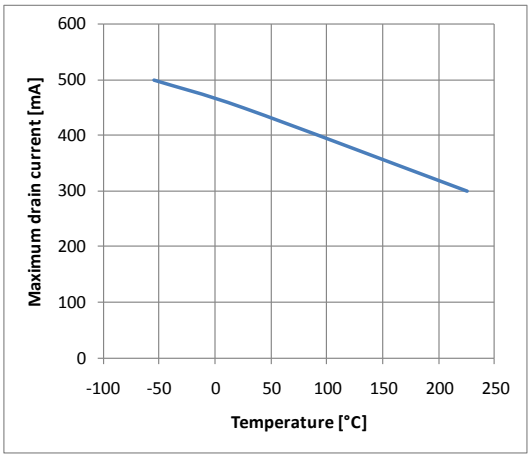
Threshold voltage vs. temperature.



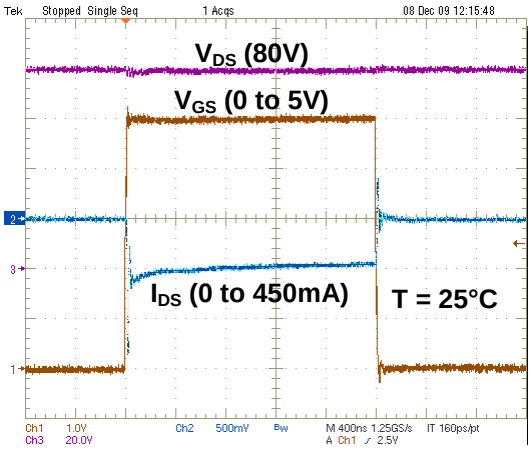
Gate and ESD diode leakage current vs. temperature (V_G=5V, V_D=50mV).



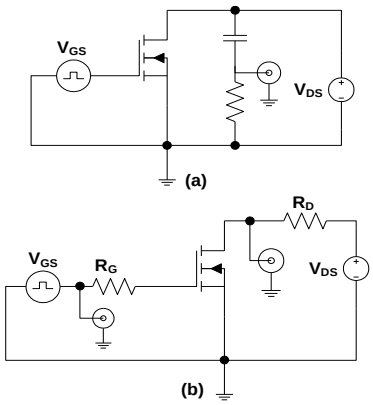
Maximum drain current pulse test (T=-55°C).



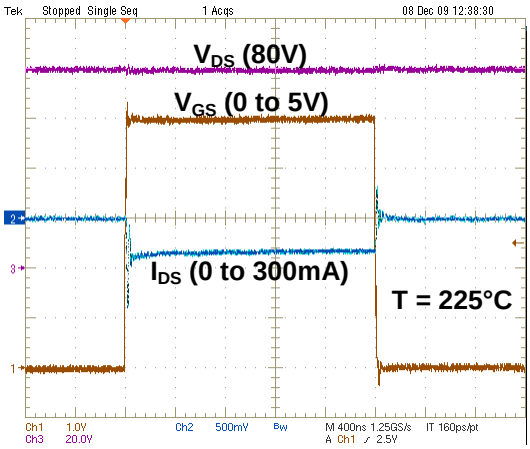
Peak drain current vs. temperature (V_G=5V, V_D=80V).



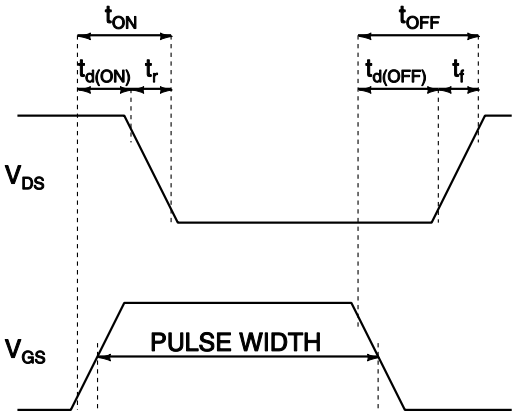
Maximum drain current pulse test (T=25°C).



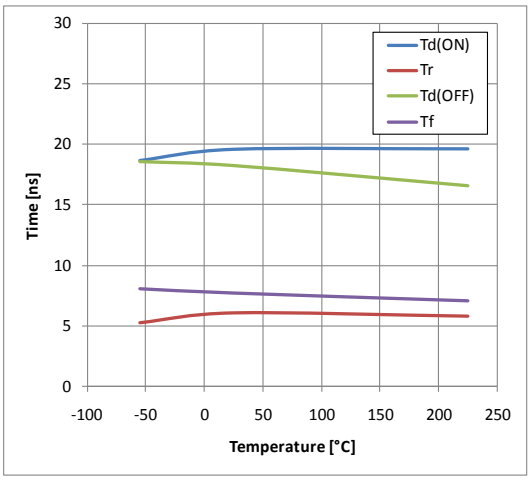
(a) I_D^{MAX} measurement scheme R=1Ω, C=100µF, Compliance (V_{DS}=80V)=100mA (b) Timing measurement scheme R_G=0Ω, R_D=82Ω, V_{DS}=40V.



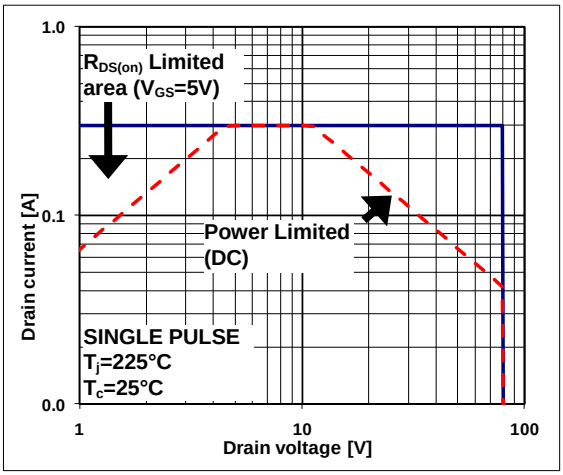
Maximum drain current pulse test (T=225°C).



Timing definition diagram.



Timing parameters versus temperature.



Forward bias safe operating area

Application Note:
CHT-SNMOS80 used as a diode

General description

CHT-SNMOS80 can be used as high temperature general purpose diode able to sustain reverse voltages of up to 80V. The typical operation temperature range goes from -55°C to 225°C.

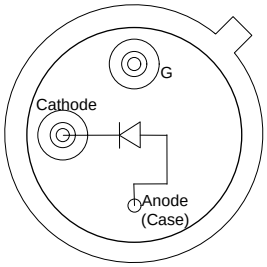
Applications

Rectification, voltage blocking, general purpose switching.

Features

- Qualified from -55 to +225°C (Tj)
- Operational up to +250°C (Tj)
- Reverse voltage up to 80V
- Forward surge current 200mA @ 225°C
- Low reverse leakage current 4 µA @ 225°C
- Available in TO39 and TO18 packages (other packages available upon request).

Package configuration



TO39 (Top view)

G pin to be connected to Anode externally!

Absolute Maximum Ratings

Reverse voltage V_R	80V
Forward surge current I_{FSM}	200mA
Power dissipation T_c=25°C	300mW
Junction temperature T_j	300°C

Operating Conditions

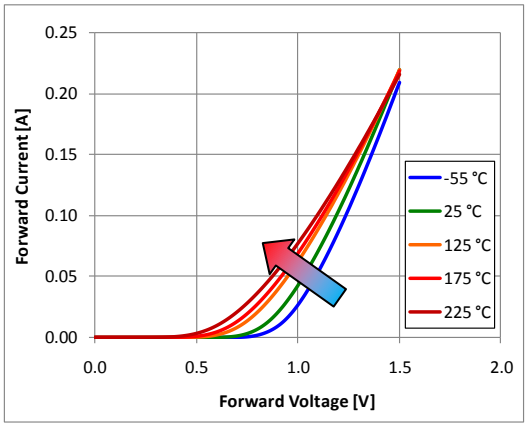
Reverse voltage V_R	0V to 80V
Continuous forward current I_F	0mA to 150mA
Forward voltage V_F	0V to 1.25V
Power dissipation T_c=25°C	200mW
Junction temperature	-55°C to +225°C

Electrical characteristics

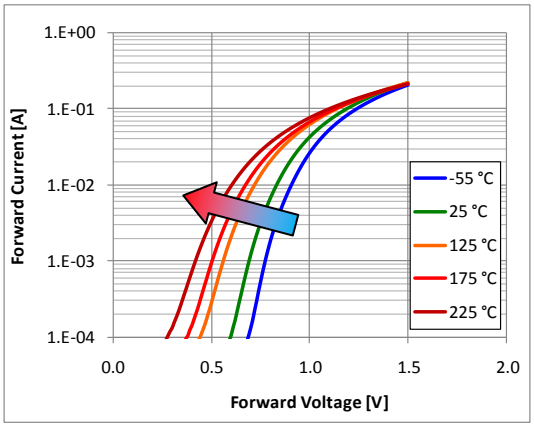
Unless otherwise stated, T_j = 25°C. **Bold** figures point out values valid over the whole temperature range (T_j = -55°C to +225°C).

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Forward voltage	V_F	I_F=1mA, T_j=25°C		0.7		V
Forward surge current	I_{FSM}				**200**	mA
Reverse leakage current	I_{RM}	V_R=80V, T_j=25°C		5		nA
		V_R=80V, T_j=225°C		4		uA
Breakdown reverse voltage	V_R		**80**			V
Junction capacitance	Cj	V_R=25V		8.6		pF

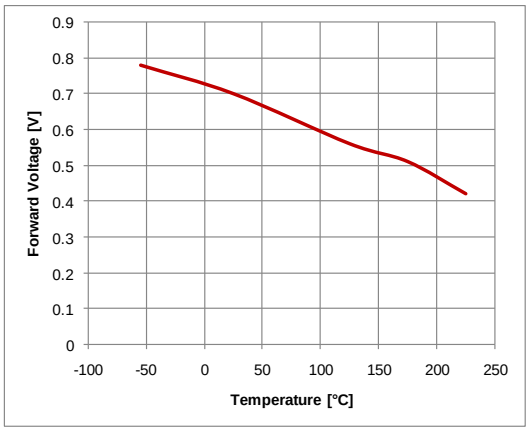
Typical Performance Characteristics



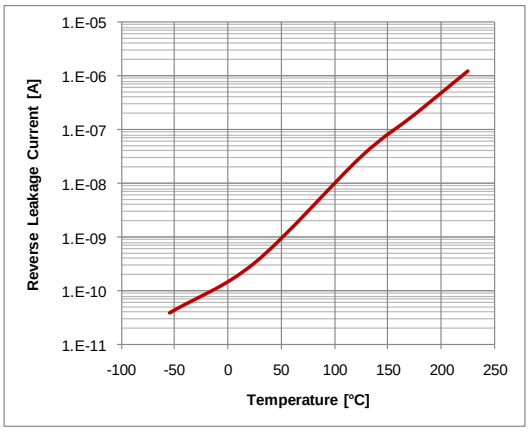
Forward current vs. forward voltage and temperature (linear scale).



Forward current vs. forward voltage and temperature (log_{10} scale).

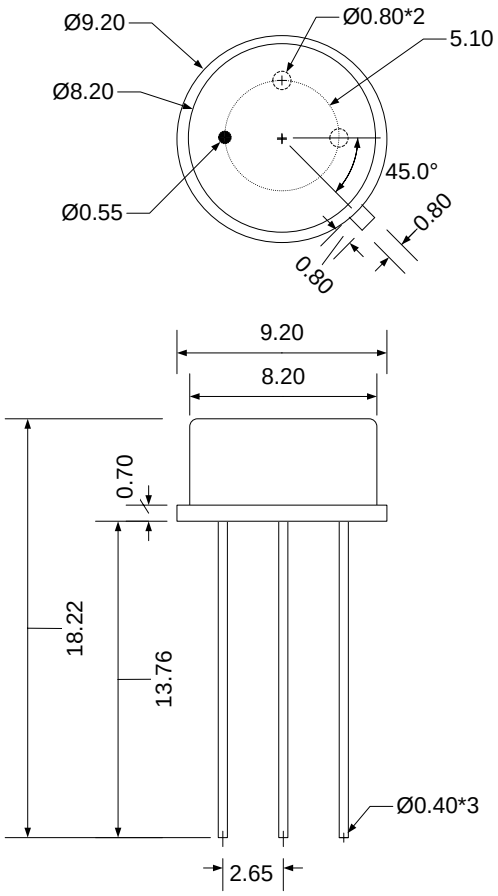


Forward voltage (at forward current I_F=1mA) vs. temperature.

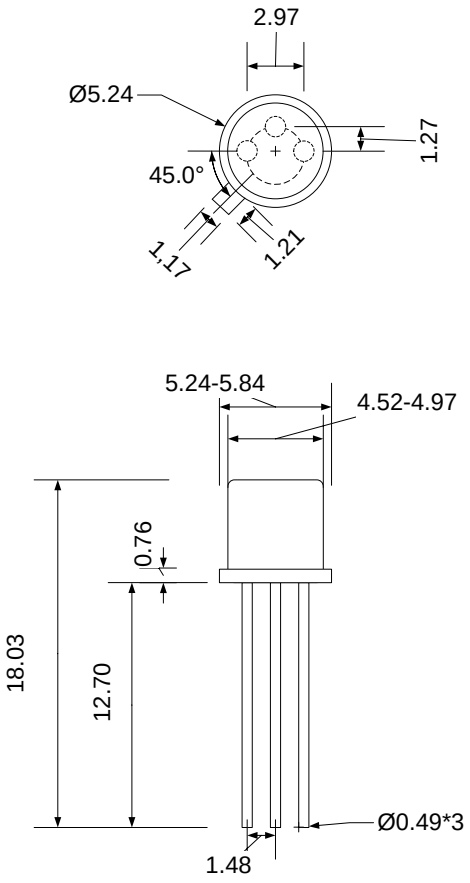


Reverse leakage current (at reverse voltage V_R=80V) vs. temperature.

Package Dimensions



Drawing TO39 (mm +/- 10%)



Drawing TO18 (mm +/- 10%)

Ordering Information

Ordering Reference	Package	Temperature Range	Marking
CHT-SNMOS80-TO39-T	TO-39 metal can	-55°C to +225°C	CHT-SNMOS80
CHT-SNMOS80-TO18-T	TO-18 metal can	-55°C to +225°C	CHT-SN8

Contact & Ordering

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