
**CHT-NEPTUNE
PRELIMINARY DATASHEET**

Version: 3.3

**High-Temperature
1200V/10A, Silicon Carbide MOSFET**

General description

CHT-NEPTUNE is a high-temperature, high-voltage, Silicon Carbide MOSFET switch. It is available in a metal TO-257 package – the metal case being isolated from the switch terminals. The product is guaranteed for normal operation on the full range -55°C to +225°C. The device has a breakdown voltage in excess of 1200V and is capable of switching currents up to 10A at the maximum temperature (225°C). The device features a body diode that can be used as free-wheeling diode.

Benefits:

- High-power density converters (support of high-frequency switching and reduced cooling)
- Extended lifetime and high reliability
- Harsh environments and high temperature power converters
- Seamless driving with CHT-Themis-Atlas and HADES® gate driver solutions

Features

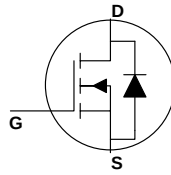
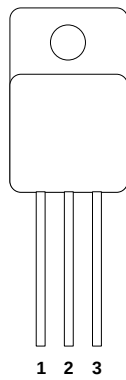
- Specified from -55 to +225°C (Tj)
- V_{DS} Max: 1200V
- I_{DS} Max (continuous):
 - 10A @ 225°C (Tj)
- Typical On-resistance:
 - R_{DSon} = 90 mΩ @ 25°C
 - R_{DSon} = 150 mΩ @ 225°C
- High Speed Switching
- Voltage control: V_{GS} = -4V/20V
- Low capacitance: C_{GS} = 1915 pF
- Package: TO-257

Applications

- Power inverters including DC-AC power supplies, motor drives & actuator controls
- DC-DC converters
- AC-DC converters and battery chargers

Package Configuration

FRONT VIEW



TO-257 (Pin1= Drain; Pin2= Source; Pin3= Gate) (case floating)

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Absolute Maximum Ratings

Gate-to-Source voltage V_{GS} -5V to 25V
Drain-to-Source voltage V_{DS} -0.5V to 1200V
Drain current I_{DS} (cont.) 12A
Max Junction temperature T_{jmax} 225°C
Power dissipation (*) 30W

Operating Conditions

Gate-to-Source voltage V_{GS} -4V to 20V
Drain-to-Source voltage V_{DS} -0.5V to 1200V
Max DC drain current I_{DS} 10A
Max pulsed drain current 10A
Junction temperature -55°C to +225°C

ESD Rating (expected)

Human Body Model >1kV

(*): including switching losses

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Electrical 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}	$T_j = 25^\circ\text{C}$; $I_D = 1\text{mA}$; $V_{DS} = 20\text{V}$		2.5		V
		$T_j = 225^\circ\text{C}$; $I_D = 1\text{mA}$; $V_{DS} = 20\text{V}$		1		V
Drain cut-off current	I_{DSS}	$V_{GS} = 0\text{V}$, $V_{DS} = 1200\text{V}$, $T_j = 25^\circ\text{C}$		20		nA
		$V_{GS} = 0\text{V}$, $V_{DS} = 1200\text{V}$, $T_j = 225^\circ\text{C}$		10		μA
		$V_{GS} = -5\text{V}$, $V_{DS} = 1200\text{V}$, $T_j = 225^\circ\text{C}$		0.27		μA
Gate leakage current	I_{GSS}	$V_{GS} = 20\text{V}$, $V_{DS} = 0\text{V}$, $T_j = 25^\circ\text{C}$		10		nA
		$V_{GS} = 20\text{V}$, $V_{DS} = 0\text{V}$, $T_j = 225^\circ\text{C}$		100		nA
Static drain-to-source resistance	$R_{DS(on)}$	$V_{GS} = 20\text{V}$, $I_D = 10\text{A}$, $T_j = 25^\circ\text{C}$		90		$\text{m}\Omega$
		$V_{GS} = 20\text{V}$, $I_D = 10\text{A}$, $T_j = 225^\circ\text{C}$		150		$\text{m}\Omega$
Breakdown drain-to-source voltage (DC characterization)	V_{BRDS}	$V_{GS} = 0\text{V}$; $I_D = 100\text{ }\mu\text{A}$	1200			V
Input capacitance	C_{ISS}	$V_{GS} = 0\text{V}_{DC}$, $V_{DS} = 600\text{V}_{DC}$		1915		pF
Output capacitance	C_{OSS}	$f = 1\text{ MHz}$		120		pF
Feedback capacitance	C_{RSS}	$V_{AC} = 25\text{mV}$		10		pF
Turn-on delay time	$T_{d(ON)}$	$V_{DS} = 600\text{V}$; $V_{GS} = -4/20\text{V}$; $I_D = 10\text{A}$; $R_G = 6.8\Omega$; $L = 856\mu\text{H}$		17		ns
Rise time	T_r			14		ns
Turn-off delay time	$T_{d(OFF)}$			62		ns
Fall time	T_f			36		ns
Turn-On Switching Loss	E_{on}			205		μJ
Turn-Off Switching Loss	E_{off}			173		μJ
Internal gate resistance	R_G	$V_{GS} = 0\text{V}_{DC}$; $f = 1\text{ MHz}$; $V_{AC} = 25\text{mV}$		5		Ω
Gate to Source Charge	Q_{GS}	$T_j = 25^\circ\text{C}$; $V_{DS} = 600\text{V}$; $I_D = 10\text{A}$; $V_{GS} = -2/20\text{V}$		23		nC
Gate to Drain Charge	Q_{GD}			43		nC
Total Gate Charge	Q_G			90		nC

Thermal Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Junction-to-Case Thermal resistance	$R_{\theta JC}$			1.1		$^\circ\text{C/W}$

Reverse Diode 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 $+225^\circ\text{C}$). Timing definitions according to JEDEC 24 page 27

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Diode forward voltage	V_F	$T_j = 25^\circ\text{C}$; $V_{GS} = -5\text{V}$; $I_F = 10\text{A}$		3.5		V
		$T_j = 25^\circ\text{C}$; $V_{GS} = -2\text{V}$; $I_F = 10\text{A}$		3.1		V
Reverse recovery time	T_{rr}	$T_j = 25^\circ\text{C}$; $V_{DS} = 300\text{V}$; $V_{GS} = -5\text{V}$;		50		ns
Peak reverse recovery current	I_{pr}	$I_F = 2\text{A}$; $dI_F/dt = 100\text{A}/\mu\text{s}$		2.3		A

Typical Performance Characteristics

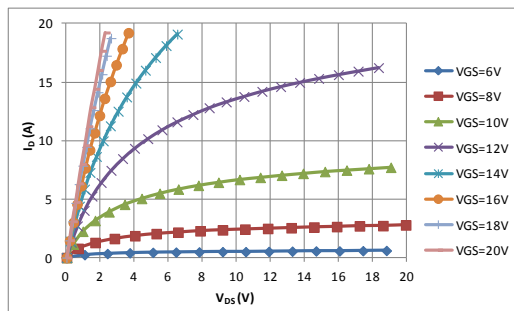


Figure 1: Drain current vs V_{DS}
($T_J=25^\circ\text{C}$)

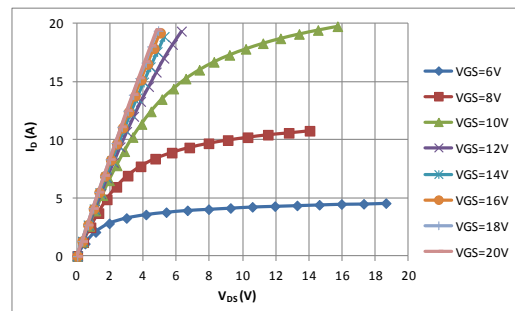


Figure 2: Drain current vs V_{DS}
($T_J=225^\circ\text{C}$)

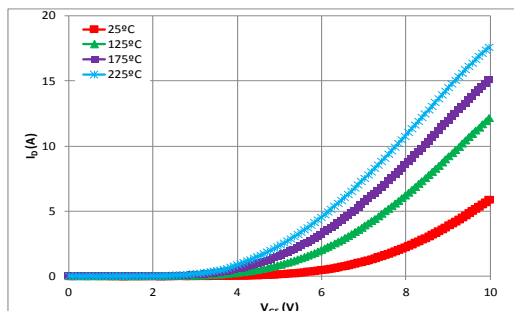


Figure 3: Drain current vs V_{GS} voltage

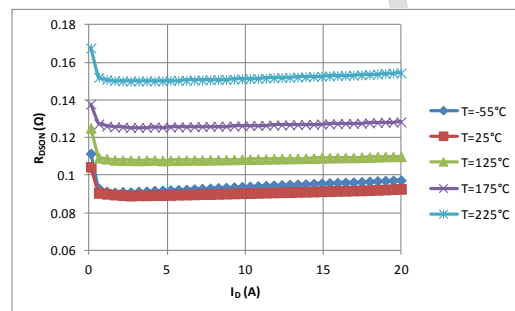


Figure 4: On-state drain source resistance
vs. Drain current and temperature ($V_{GS} = 20\text{V}$)

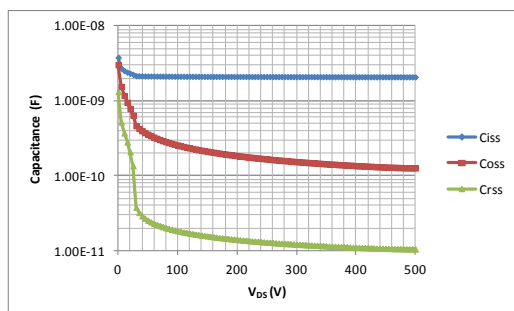
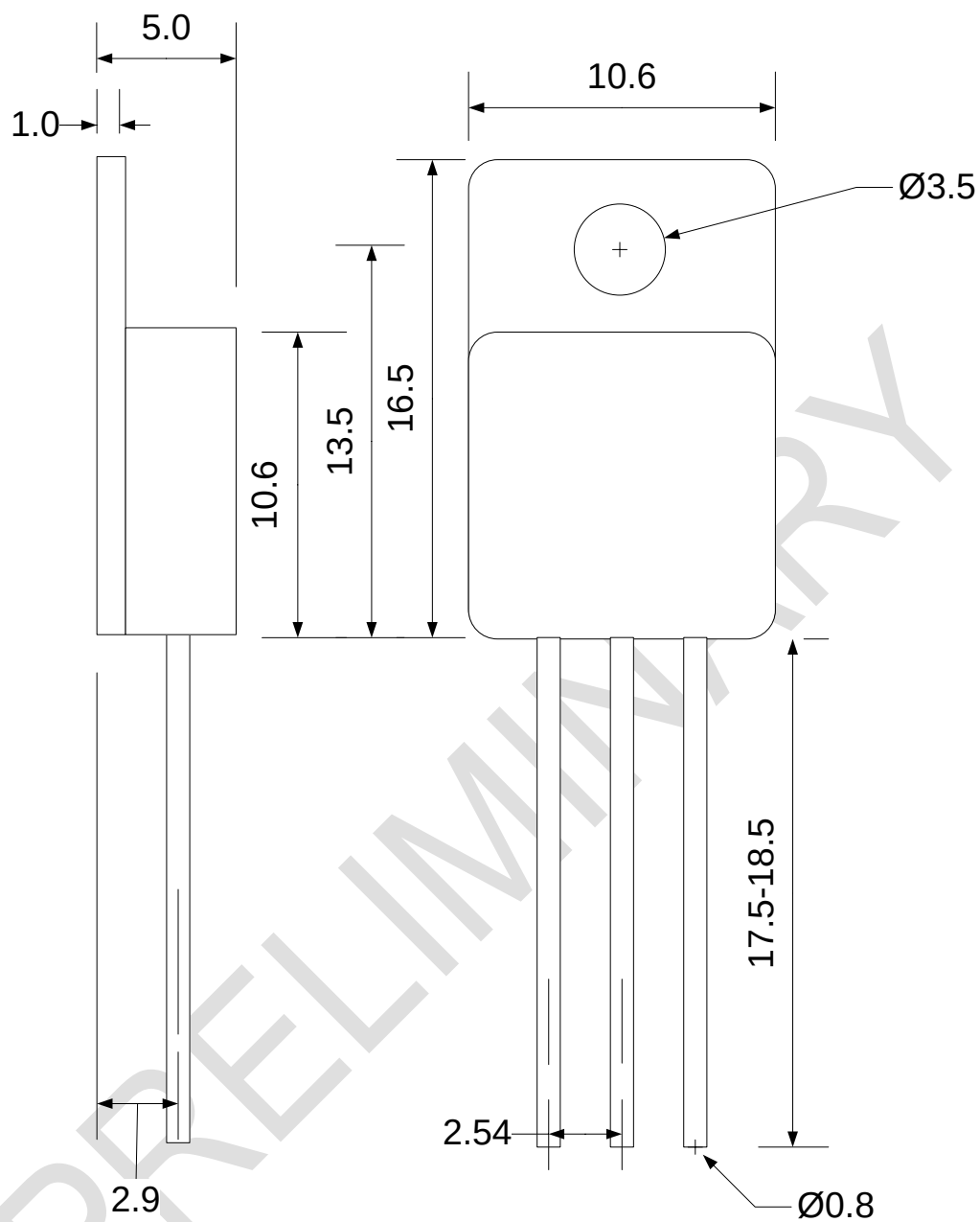


Figure 5: Typical capacitances vs V_{DS}
($T_J=25^\circ\text{C}$)

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Package Dimensions



Drawing TO257 (mm)

Ordering Information

Product Name	Ordering Reference	Package	Marking
CHT-NEPTUNE	CHT-PLA8543C-TO257-T	TO-257 metal can	CHT-PLA8543C

Contact & Ordering

CISOID S.A.

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