CHT-NEPTUNE-1202
Preliminary Datasheet
High Temperature 1200V/2A SiC MOSFET

Version: 1.1
14-Dec-23
(Last Modification Date)

General description

CHT-NEPTUNE-1202 is an High Temperature, High Voltage, Silicon Carbide MOSFET switch. It is available in a metal TO-257 package – the metal case being electrically isolated from the switch terminals. The product is guaranteed for operation on the full range from -55°C to +210°C (Tj). The device has a breakdown voltage in excess of 1200V and is capable of switching currents up to 2A. The device features a body diode that can be used as free-wheeling diode.

CHT-NEPTUNE-1202 is well suited to switch high voltage and moderate current in auxiliary or low power Flyback DC-DC converters.

Features

- Specified from -55 to +210°C (Tj)
- V_{DS} Max: 1200V
- Max Continuous Current
  - 2A at T_c=160°C
  - 1.68A at T_c=175°C
- Max Pulsed Current: 5A
- Switching losses at I_D=1A & V_{DS}=800V
  - Eon < 60 µJ
  - Eoff < 33 µJ
- Typical On-resistance
  - R_{DSon}= 1.15 Ω @ Tj=25°C
  - R_{DSon}= 3.1 Ω @ Tj=210°C
- Voltage control: V_{GS}=-5V/20V
- Low gate charge: Q_{GS}: 4nC
- Hermetic package with isolated case

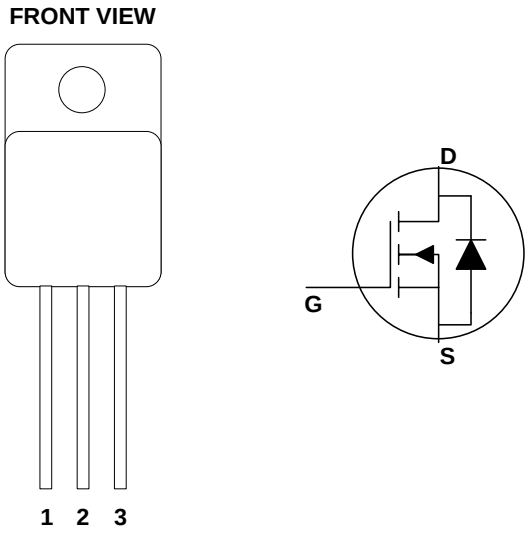
Benefits

- High Temperature Operation
- Extended lifetime and high reliability
- Low Switching Energy for low loss operation & high speed switching
- Pins electrically isolated from the case easing mechanical and thermal integration
- Seamless driving with HADES® gate driver solutions

Applications

- Auxiliary Flyback converter primary switch
- Low power Flyback converters

Package configuration and Pin Description



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

Absolute Maximum Ratings

Gate-to-Source voltage V_{GS}	-6V to 22V
Drain-to-Source voltage V_{DS}	1200V
Max DC Drain current I_{DS} at T_C=175°C	2A
Max Pulsed Current	5A
Max Junction temperature T_{jmax}	210°C
Power dissipation at Tc=175°C (*)	8.5W

Operating Conditions

Gate-to-Source voltage V_{GS}	-5V to 20V
Drain-to-Source voltage V_{DS}	1200V
Max DC drain current I_{DS} at T_C=160°C	2A
Max DC drain current I_{DS} at T_C=175°C	1.6A
Max pulsed drain current	4A
Junction temperature	-55°C to +210°C

ESD Rating

Human Body Model	>1kV

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 +210°C).

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Threshold voltage	V_{TH}	T_j=25°C ; I_D = 1mA; V_{DS} = 20V		2.8		V
		T_j=210°C ; I_D = 1mA; V_{DS} = 20V		2.5		V
Drain cut-off current	I_{DSS}	V_{GS} =-5V, V_{DS}=1200V, T_j=25°C		10		nA
		V_{GS} =-5V, V_{DS} =1200V, T_j=210°C		100		nA
Gate leakage current	I_{GSS}	V_{GS} =20V, V_{DS} =1200V, T_j=25°C		100		nA
		V_{GS} =20V, V_{DS} =1200V,T_j=210°C		1000		nA
Static drain-to-source resistance	R_{DSon}	V_{GS} =20V, ID=1A, T_j=25°C		1.15		Ω
		V_{GS} =20V, ID=1A, T_j=210°C		3.1		Ω
Breakdown drain-to-source voltage (DC characterization)	V_{BRDS}	V_{GS} =0V; ID = 1 mA	**1200**			V
Input capacitance	C_{ISS}	V_{GS} =0V_{DC}, V_{DS} =800V f = 1 MHz V_{AC} = 25mV		184		pF
Output capacitance (includes diode capacitance)	C_{OSS}			16		pF
Feedback capacitance	C_{RSS}			6		pF
Turn-on delay time	$T_{d(ON)}$	VDD=800V, ID=1.1A VGS=18V/0V RG=0Ω L=2mH		16		ns
Fall time	T_r			21		ns
Turn-off delay time	$T_{d(OFF)}$			35		ns
Rise time	T_f			74		ns
Turn-On Switching Loss	E_{on}			57		µJ
Turn-Off Switching Loss	E_{off}			32		µJ
Internal gate resistance	R_G	V_{GS} =0$V_{DC;}$ f = 1 MHz; V_{AC} = 25mV		64		Ω
Gate to Source Charge	Q_{GS}	VDD=500V ID=1A VGS=18V RL=500Ω		4		nC
Gate to Drain Charge	Q_{GD}			5		nC
Total Gate Charge	Q_G			14		nC
Diode forward voltage	V_F	Tj=25°C; IF=1A		4.47		V
		Tj=210°C; IF=1A		3.8		V
Reverse recovery time	t_{rr}	IF=1A VR=800V di/dt=300A/µs		21		ns
Peak reverse recovery current	I_{rrm}			1.1		A

Thermal Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Junction-to-Case Thermal resistance	$R_{\Theta JC}$			4		°C/W

Typical performances

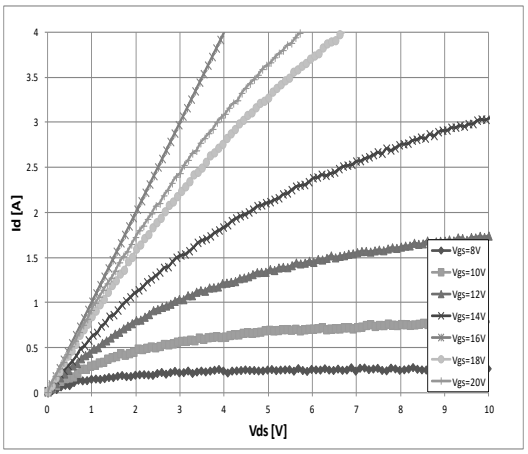


Figure 1: Drain current vs V_{DS} (T_j=25°C)

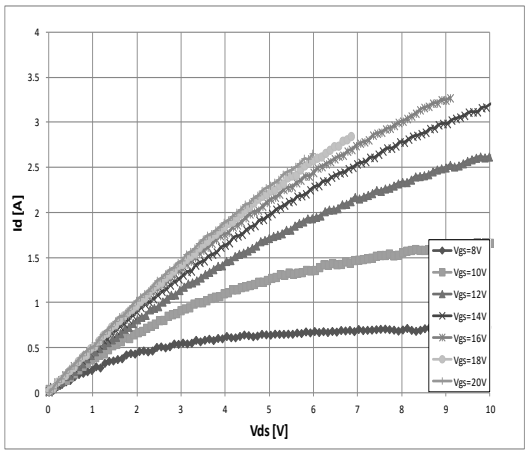


Figure 2: Drain current vs V_{DS} (T_j=125°C)

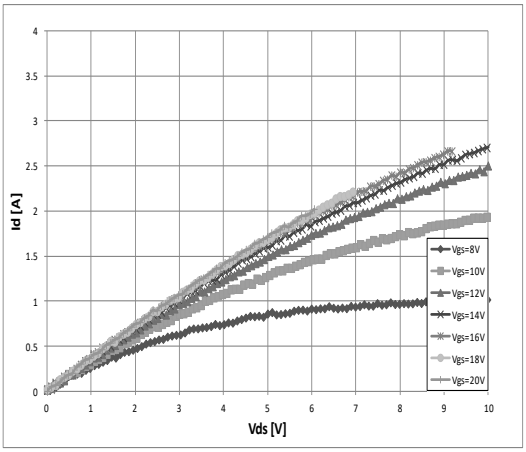


Figure 3: Drain current vs V_{DS} (T_j=175°C)

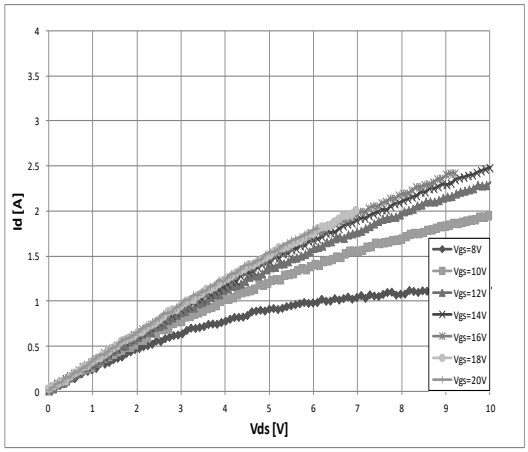


Figure 4: Drain current vs V_{DS} (T_j=210°C)

TBD

Figure 5: Drain current vs V_{DS} (T_j=-55°C)

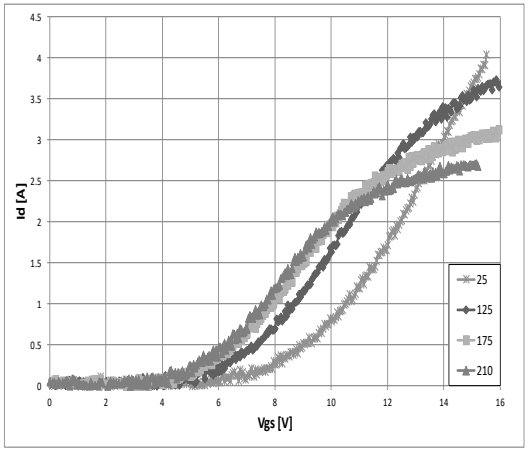


Figure 6: Drain current vs V_{GS} voltage (V_{DS}= 10V)

Typical performances (cnt'd)

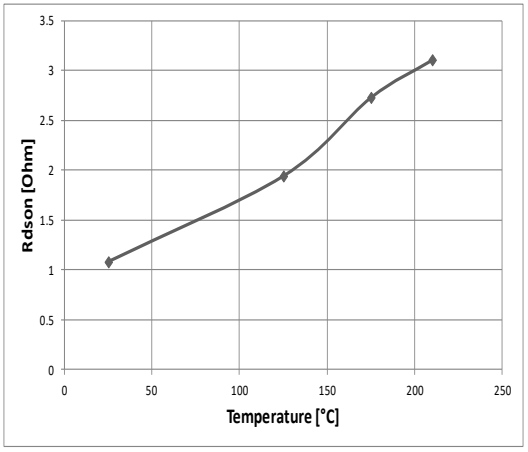


Figure 7: On-state drain source resistance vs. Temperature (V_{GS} =20V; I_{DS}=1A)

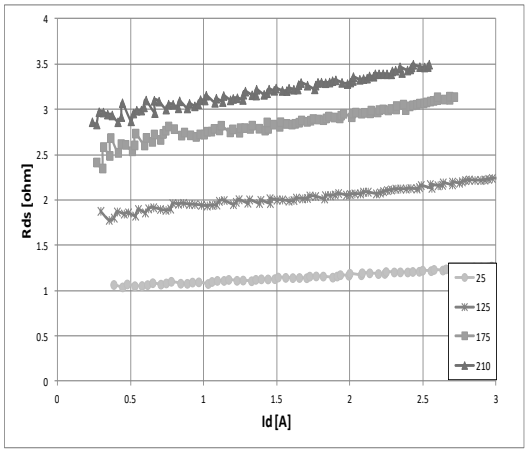


Figure 8: On-state drain source resistance vs. Drain current and temperature (V_{GS} =20V)

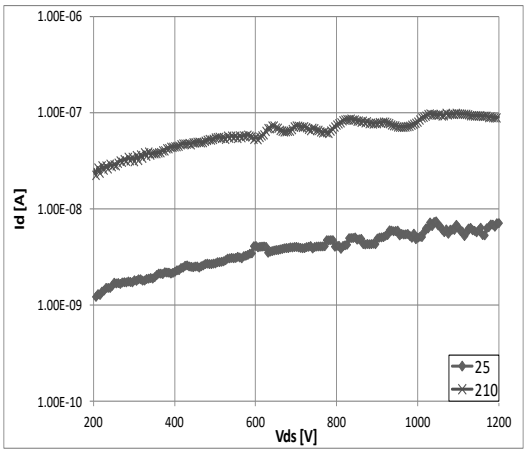


Figure 9: Drain current vs V_{DS} (V_{GS}= -5V)

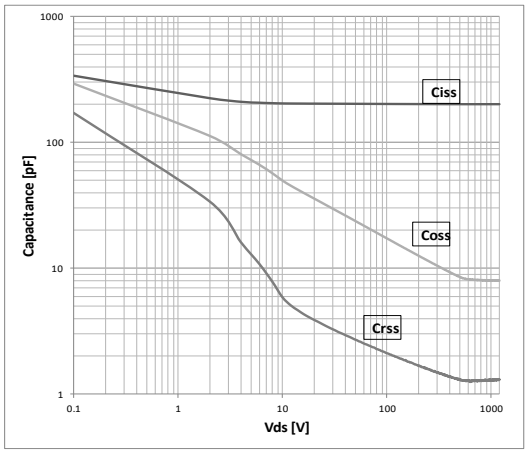


Figure 10:Typical capacitances vs V_{DS} (T_j=25°C)

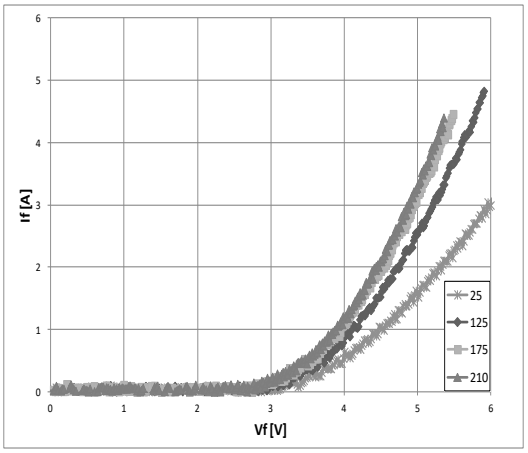
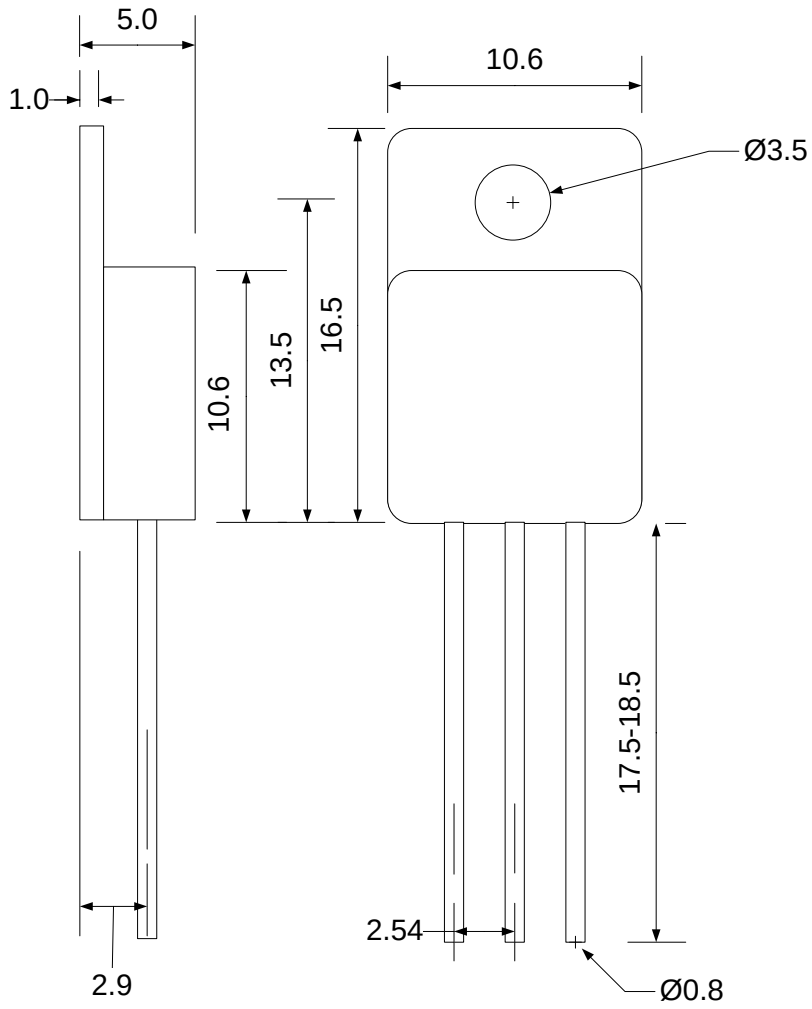


Figure 11: Diode I_F vs V_F (VGS=-5V)

Package Dimensions



Drawing TO257 in mm (+/- 10%)

Ordering Information

Product Name	Ordering Reference	Package	Marking
CHT-NEPTUNE-1202	CHT-PLA9471A-TO257-T	TO257	CHT-PLA9471A

Contact & Ordering

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