NTH4L160N120SC1

Product Preview

N-Channel Silicon Carbide MOSFET

1200 V, 162 mΩ, 27.3 A

ON Semiconductor®

www.onsemi.com

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain−to−Source Voltage		V_{DSS}	1200	V
Gate−to−Source Voltage		V_{GS}	±20	V
Continuous Drain Current $R_{\theta JC}$	T_C = 25°C	I_{DC}	27.3	A
Power Dissipation $R_{\theta JC}$		P_{DC}	185	W
Continuous Drain Current $R_{\theta JC}$	T_C = 100°C	I_{DC}	19.3	A
Power Dissipation $R_{\theta JC}$		P_{DC}	92.5	W
Continuous Drain Current $R_{\theta JA}$	T_A = 25°C	I_{DA}	TBD	A
Power Dissipation $R_{\theta JA}$		P_{DA}	TBD	W
Continuous Drain Current $R_{\theta JA}$	T_A = 100°C	I_{DA}	TBD	A
Power Dissipation $R_{\theta JA}$		P_{DA}	TBD	W
Pulsed Drain Current $R_{\theta JC}$	T_C = 25°C, t_p = 10 μs	I_{DM}	126	A
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)		I_S	39.1	A
Single Pulse Avalanche Energy (T_J = 25°C, V_{GS} = 20 V, I_{LPK} = 1 A, L = 0.1 mH, R_G = 25 Ω)		E_{AS}	TBD	mJ
Lead Temperature for Soldering Purposes		T_L	TBD	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

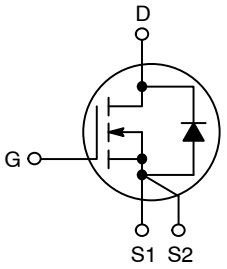
THERMAL CHARACTERISTICS

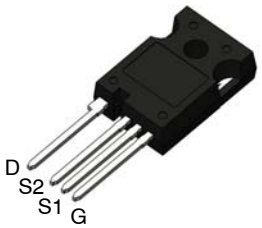
Parameter	Symbol	Value	Unit
Thermal Resistance, Junction−to−Case	$R_{\theta JC}$	0.81	°C/W
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	TBD	

This document contains information on a product under development. ON Semiconductor reserves the right to change or discontinue this product without notice.

$V_{(BR)DSS}$	$R_{DS(on)}$	I_D
1200 V	162 mΩ @ 20 V	27.3 A

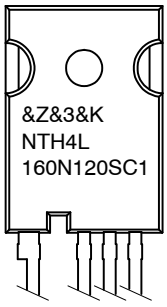
N−CHANNEL MOSFET





TO−247−4LD
CASE 340CJ

MARKING DIAGRAM



&Z = Assembly Plant Code
&3 = Data Code (Year & Week)
&K = Lot
NTH4L160N120SC1 = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 2.50e − 04A, T_C = 25°C	1200	−	−	V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSSTj}$	V_{GS} = 0 V, I_D = 2.50e − 04A, T_{Jmax} = 175°C	−	0.25	−	V/°C
Zero Gate Voltage Drain Current	I_{DSS}	T_C = 25°C	−	−	10.0	μA
		T_C = 175°C	−	−	250	
Gate−to−Source Leakage Current	I_{GSS}	V_G = 20 V, V_D = 0 V	−	−	250	nA
ON CHARACTERISTICS						
Drain−to−Source On Resistance	$R_{DS(on)}$	V_G = 20 V, I_D = 9.90 A	−	162	−	mΩ
Gate Threshold Voltage	$V_{GS(th)}$	V_G = V_D, I_D = 2.48e − 03A	−	2.83	−	V
Gate Threshold Voltage Temperature Coefficient	$V_{GS(th)}/T_J$		−	−5.37	−	mV/°C
Forward Transconductance	g_{FS}	V_D = 10.0 V, I_D = 9.90 A	−	3.90	−	S
CHARGES, CAPACITANCES & GATE RESISTANCE						
Gate Resistance	R_G	V_G = 0 V, V_D = 1000 V	−	3.09	−	Ω
Input Capacitance	C_{ISS}		−	690	−	pF
Reverse Transfer Capacitance	C_{RSS}		−	1.92	−	
Output Capacitance	C_{OSS}		−	39.1	−	
Effective Output Capacitance	C_{OSSef}	V_{DS} = 0 to 1000 V, V_G = 0 V	−	65.4	−	
Energy Related Output Capacitance	C_{OSSer}		−	47.4	−	
Coss Stored Energy	E_{OSS}		−	23.7	−	μJ
Total Gate Charge	$Q_{G(tot)}$	V_D = 800 V, I_D = 4.95 A, V_G = 20 V	−	24.1	−	nC
Gate−to−Source Charge	Q_{GS}		−	5.95	−	
Gate−to−Drain Charge	Q_{GD}		−	5.71	−	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{d(on)}$	V_G = −5/20 V, I_D = 9.9 A, V_D = 800 V, R_G = 2 Ω	−	−4.37	−	ns
Turn-Off Delay Time	$t_{d(off)}$		−	9.74	−	
Rise Time	t_r		−	2.81	−	
Fall Time	t_f		−	7.65	−	
Turn-On Switching Loss	E_{ON}		−	0.06	−	mJ
Turn-Off Switching Loss	E_{OFF}		−	0.02	−	
Total Switching Loss	E_{TOT}		−	0.08	−	
DRAIN−SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	I_D = 4.95 A	−	3.84	−	V
Reverse Recovery Time	t_{RR}	I_D = 9.9 A, dI/dt = 1000 A/μs, V_{DS} = 800 V, V_{GS} = −5/20 V	−	22.3	−	ns
Reverse Recovery Charge	Q_{RR}		−	75.6	−	nC
Reverse Recovery Energy	E_{REC}		−	19.8	−	μJ
Peak Reverse Recovery Current	I_{RRM}		−	5.33	−	A

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL PERFORMANCE CHARACTERISTICS

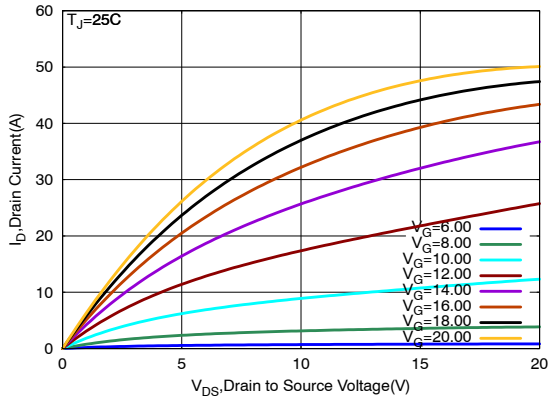


Figure 1. On−Region Characteristics

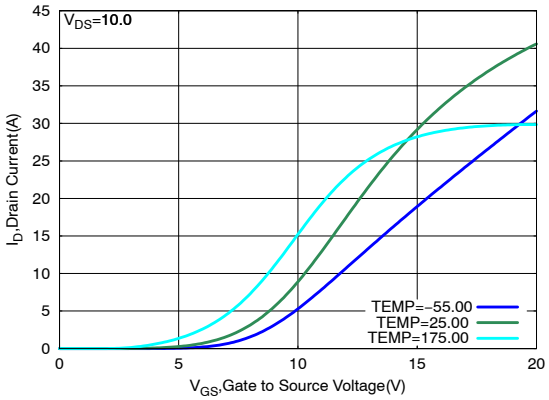


Figure 2. Transfer Characteristics

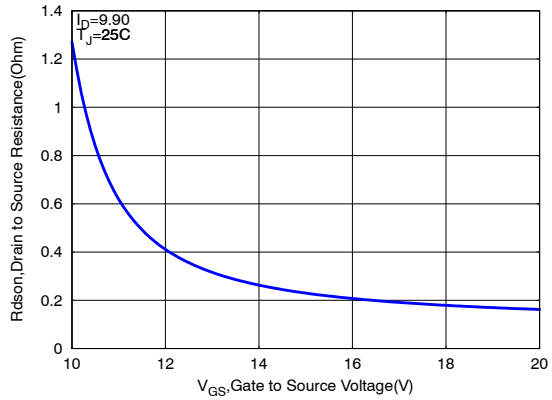


Figure 3. On−Resistance vs. VGS

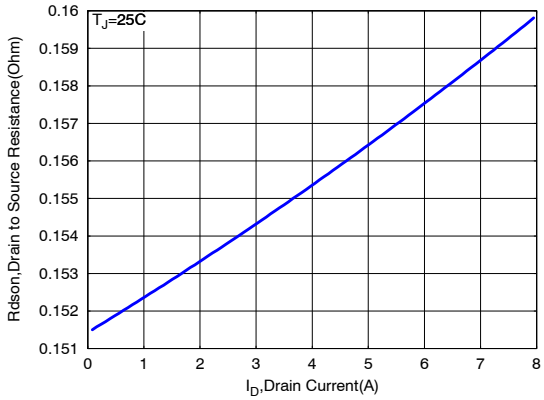


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

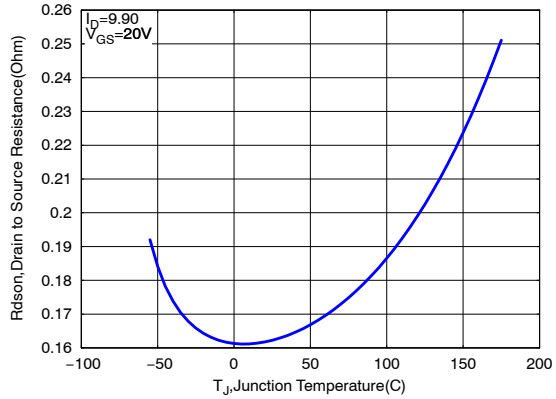


Figure 5. On−Resistance Variation with Temperature

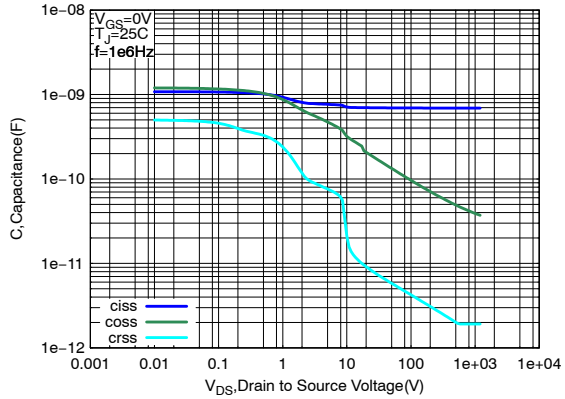


Figure 6. Capacitance Variation

TYPICAL PERFORMANCE CHARACTERISTICS

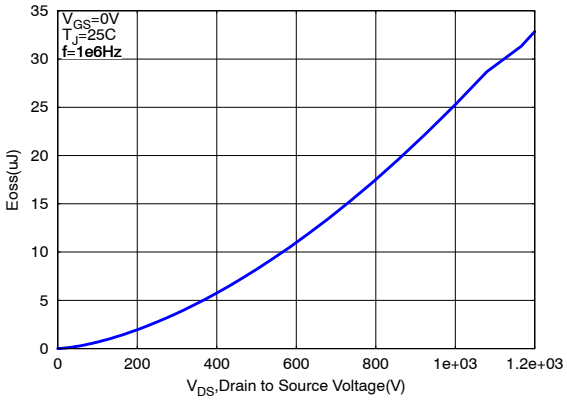


Figure 7. Eoss vs. Drain−to−Source Voltage

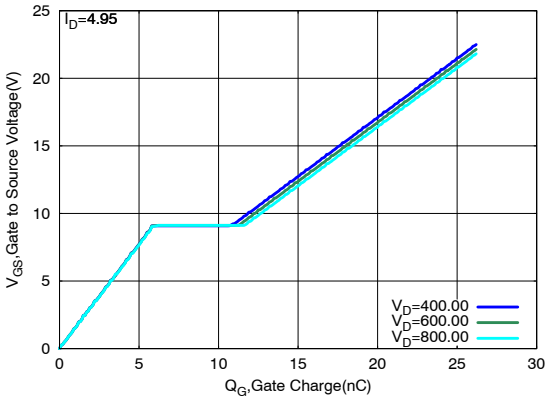


Figure 8. Gate−to−Source Voltage vs. Total Charge

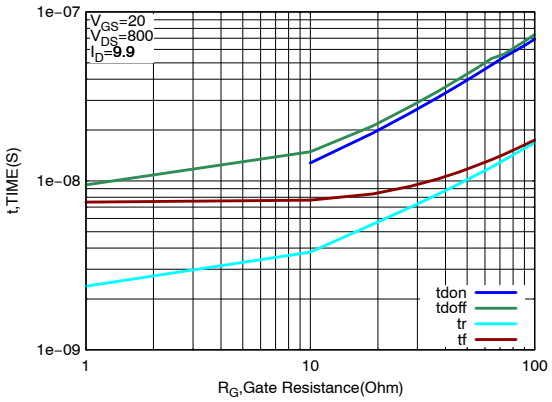


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

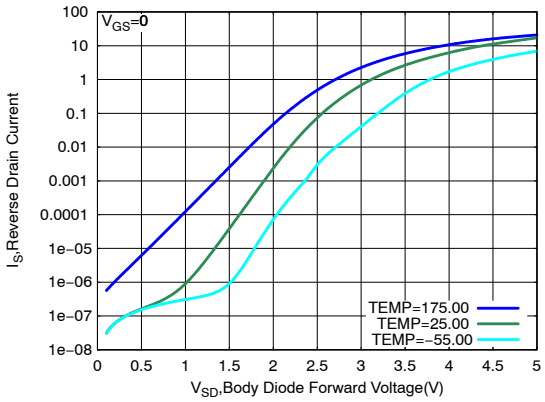


Figure 10. Diode Forward Voltage vs. Current

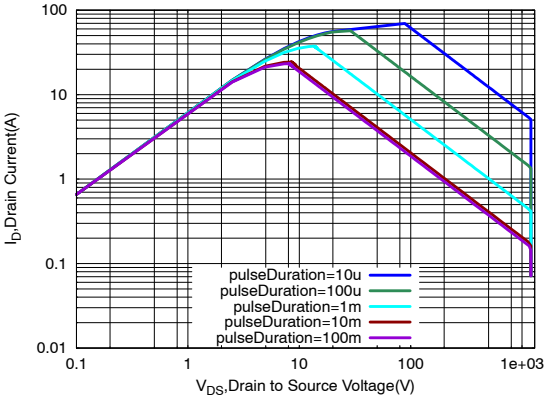


Figure 11. Maximum Rated Forward Biased Safe Operating Area

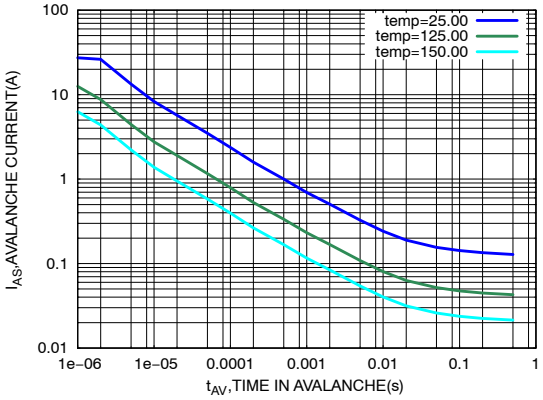


Figure 12. Ipeak vs. Time in Avalanche

TYPICAL PERFORMANCE CHARACTERISTICS

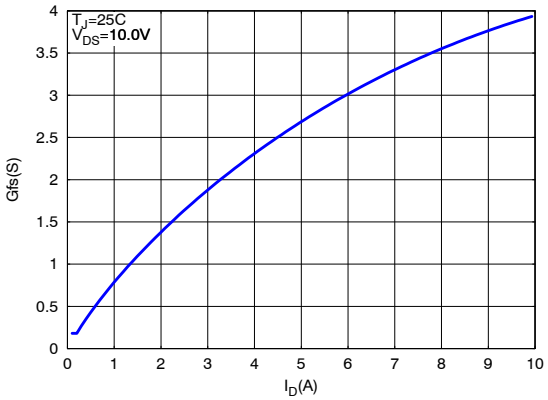


Figure 13. GFS vs. ID

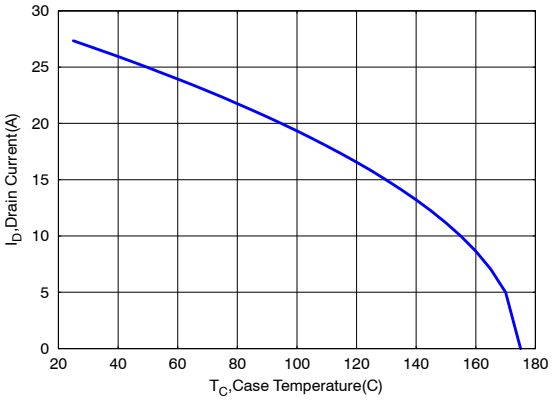


Figure 14. Maximum Current vs. Case Temperature

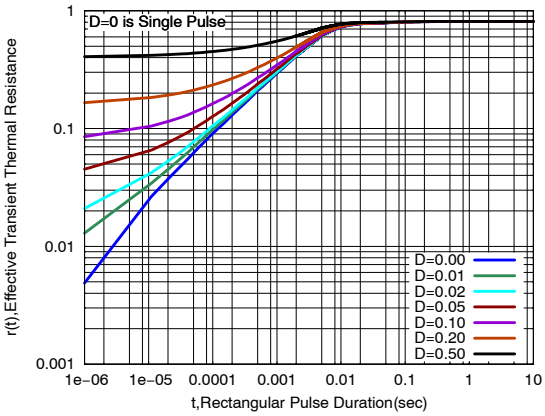


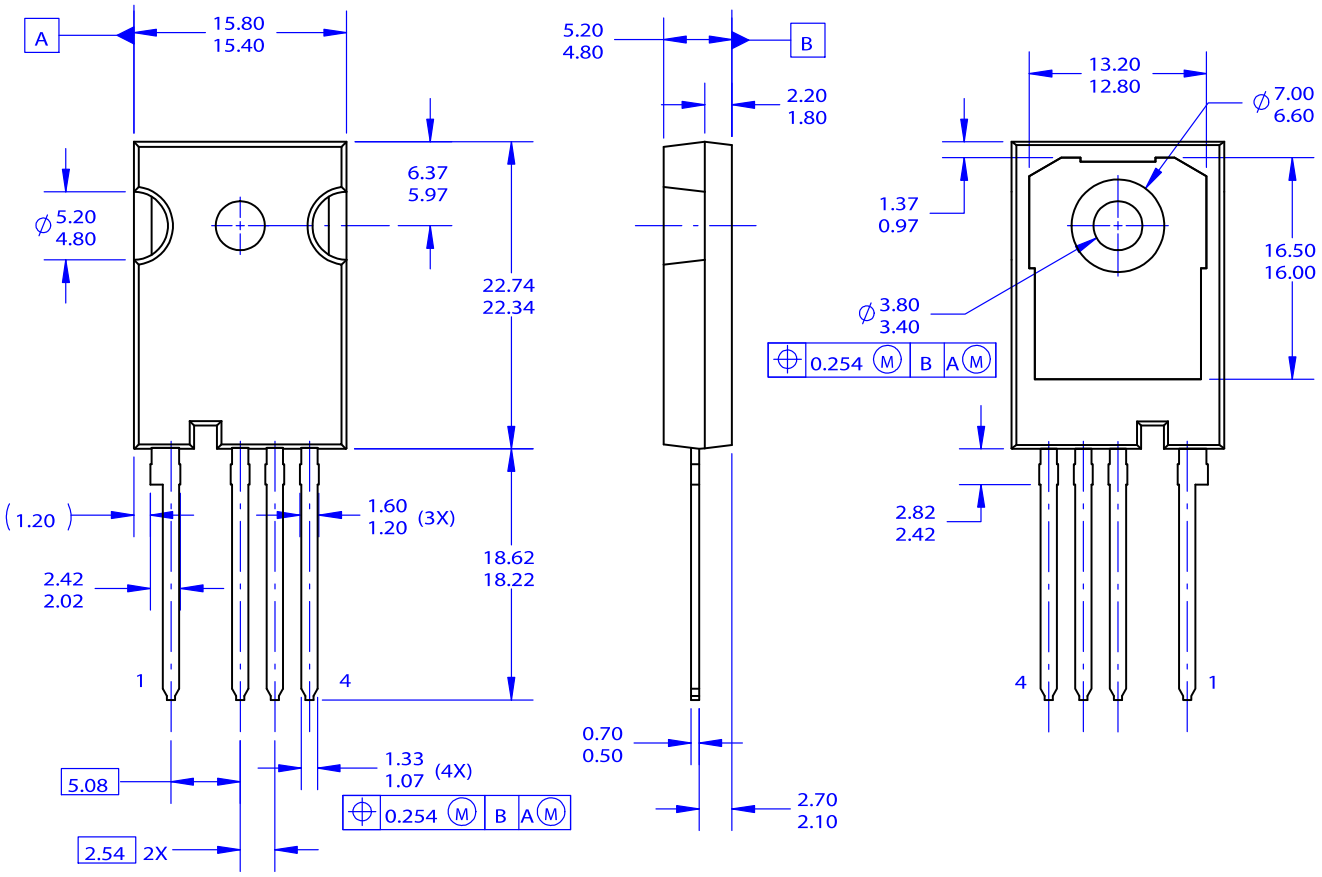
Figure 15. Thermal Response

PACKAGE MARKING AND ORDERING INFORMATION

Part Number	Top Marking	Package	Packing Method	Reel Size	Tape Width	Quantity
NTH4L160N120SC1	NTH4L160N120SC1	TO−247	Tube	N/A	N/A	30 Units

PACKAGE DIMENSIONS

TO−247−4LD
CASE 340CJ
ISSUE O



NOTES:

A. NO INDUSTRY STANDARD APPLIES TO THIS PACKAGE.
B. DIMENSIONS ARE EXCLUSIVE OF BURRS,MOLD FLASH,AND TIE BAR EXTRUSIONS.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DRAWING CONFORMS TO ASME Y14.5-2009.

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

N. American Technical Support: 800−282−9855 Toll Free USA/Canada
Europe, Middle East and Africa Technical Support:
Phone: 421 33 790 2910

ON Semiconductor Website: **www.onsemi.com**

Order Literature: http://www.onsemi.com/orderlit

For additional information, please contact your local Sales Representative