



1200V SiC MOSFETs

General Description

The 1200V SiC MOSFETs has been especially tailored to minimize on-state resistance, provide superior switching performance, higher system efficiency, and faster operating frequency.

These devices are well suited for high efficiency fast switching applications.

BV_{DSS}	$R_{DS(ON)}$	I_D
1200 V	52 m Ω	40 A

Features

- $R_{DS(ON)} \leq 52m\Omega @ V_{GS}=10V$
- Improved dv/dt Capability
- High Speed Switching
- Green Device Available

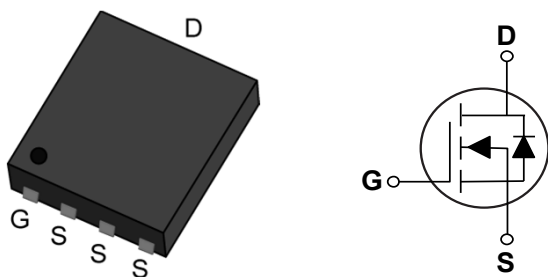
Benefits

- Lower Capacitance
- Higher System Efficiency
- Easy to Parallel

Applications

- Solar Inverters
- Switch Mode Power Supplies, UPS
- Induction Heating and Welding
- EV Charging Stations
- High Voltage DC/DC Converters
- Motor Drives

DFN8080 Pin Configuration



Ordering Information

Part No.	Remark	Package
NLSNAL052	Halogen Free	DFN8080
NLSNAL052-Q	AEC-Q101 Qualified	

Maximum Ratings $T_J=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	1200	V
$V_{GS(max)}$	Gate-Source Voltage	-10 / +25	V
$V_{GS(op)}$	Gate-Source Voltage (Recommended operational)	-5 / +20	V
I_D	Drain Current – Continuous ($T_C=25^\circ\text{C}$, $T_J=175^\circ\text{C}$)	40	A
I_D	Drain Current – Continuous ($T_C=100^\circ\text{C}$, $T_J=175^\circ\text{C}$)	30	A
I_{DM}	Drain Current – Pulsed ($T_C=25^\circ\text{C}$) (NOTE 1)	101	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	400	mJ
P_D	Power Dissipation ($T_C=25^\circ\text{C}$)	150	W
T_J	Operating Junction Temperature Range	-55 to 175	$^\circ\text{C}$
T_{STG}	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
Marking Code		SNAL052	



Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	62	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	1	$^{\circ}\text{C}/\text{W}$

Electrical Characteristics ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}$, $I_D=1\text{mA}$	1200	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=1200\text{V}$, $V_{GS}=0\text{V}$	---	---	1	μA
		$V_{DS}=1200\text{V}$, $V_{GS}=0\text{V}$, $T_J=175^{\circ}\text{C}$	---	1	---	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=20\text{V}$, $V_{DS}=0\text{V}$	---	---	100	nA
		$V_{GS}=-5\text{V}$, $V_{DS}=0\text{V}$	---	---	-100	

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=20\text{V}$, $I_D=20\text{A}$	---	---	52	m Ω
		$V_{GS}=20\text{V}$, $I_D=10\text{A}$	---	---	45	
		$V_{GS}=20\text{V}$, $I_D=10\text{A}$, $T_J=125^{\circ}\text{C}$	---	56	---	
		$V_{GS}=20\text{V}$, $I_D=10\text{A}$, $T_J=175^{\circ}\text{C}$	---	73	---	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=10\text{mA}$	2.0	---	4.0	V
		$V_{GS}=V_{DS}$, $I_D=10\text{mA}$, $T_J=125^{\circ}\text{C}$	---	1.8	---	
		$V_{GS}=V_{DS}$, $I_D=10\text{mA}$, $T_J=175^{\circ}\text{C}$	---	1.6	---	

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	$V_{DD}=800\text{V}$, $V_{GS}=-5/+20\text{V}$, $I_D=20\text{A}$	---	118	---	nC
Q_{gs}	Gate-Source Charge		---	53	---	
Q_{gd}	Gate-Drain Charge		---	10	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=800\text{V}$, $R_G=2.5\Omega$, $I_D=40\text{A}$, $V_{GS}=-5/+20\text{V}$	---	14	---	nS
T_r	Rise Time		---	5	---	
$T_{d(off)}$	Turn-Off Delay Time		---	23	---	
T_f	Fall Time		---	14	---	
C_{iss}	Input Capacitance	$V_{DS}=1000\text{V}$, $V_{GS}=0\text{V}$, $F=200\text{kHz}$	---	3192	---	pF
C_{oss}	Output Capacitance		---	132	---	
C_{rss}	Reverse Transfer Capacitance		---	7	---	
E_{oss}	Coss Stored Energy		---	77	---	
$E_{(on)}$	Turn-On Switching Energy	$V_{DD}=800\text{V}$, $R_G=2.5\Omega$, $I_D=40\text{A}$, $V_{GS}=-5/+20\text{V}$	---	446	---	μJ
$E_{(off)}$	Turn-Off Switching Energy		---	68	---	
$E_{(tot)}$	Total Switching Energy		---	514	---	
R_g	Gate Resistance	$V_{GS}=0\text{V}$, $V_{DS}=0\text{V}$, $F=1\text{MHz}$	---	1.9	---	Ω



Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Drain-Source Diode Characteristics and Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Body Diode Current	$V_{GS} = -5V, T_C = 25^\circ\text{C}$	---	---	40	A
V_{SD}	Diode Forward Voltage	$V_{GS} = -5V, I_S = 20A$	---	3.8	---	V
t_{rr}	Reverse Recovery Time	$V_{GS} = -5V, I_S = 20A, V_R = 800V, di_F/dt = 3.6A/ns$	---	24	---	nS
Q_{rr}	Reverse Recovery Charge		---	297	---	nC
I_{RRM}	Peak Reverse Recovery Current		---	21	---	A

NOTES :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $I_{AS}=28.3A, V=50V, L=1.0mH$.

Typical Performance

FIG. 1-Output Characteristics $T_J=25^\circ\text{C}$

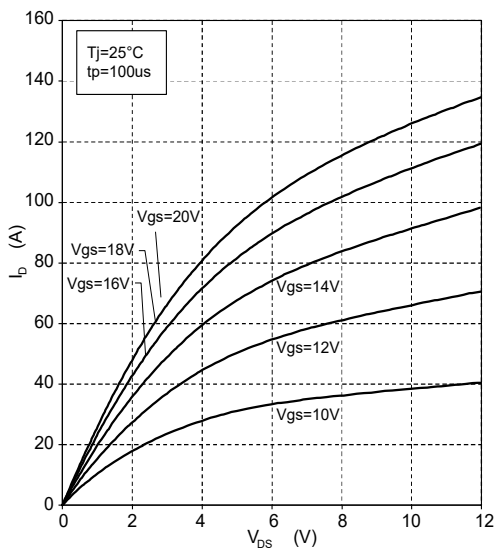
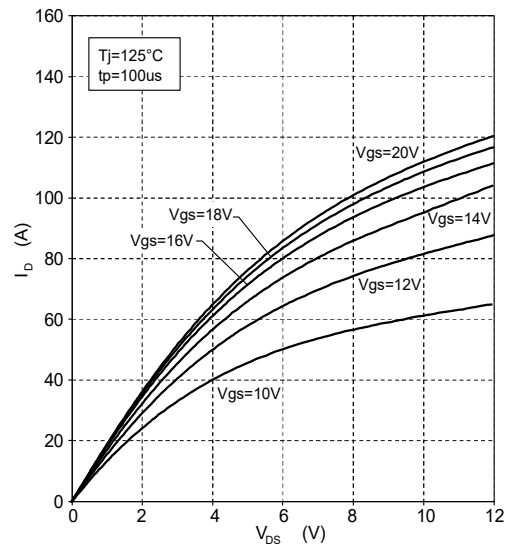


FIG. 2-Output Characteristics $T_J=125^\circ\text{C}$





Typical Performance

FIG. 3-Output Characteristics $T_J=175^\circ\text{C}$

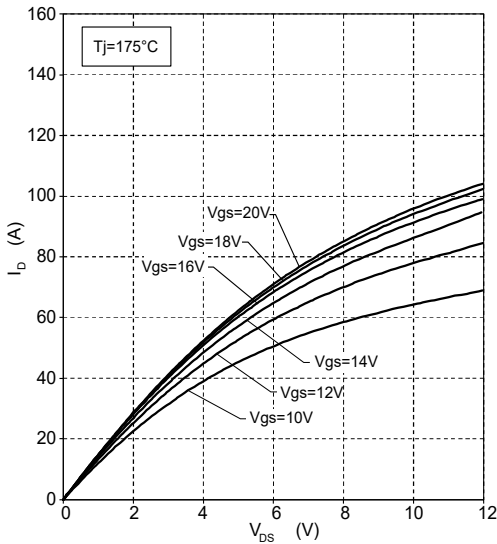


FIG. 4-Normalized $R_{DS(ON)}$ vs T_J

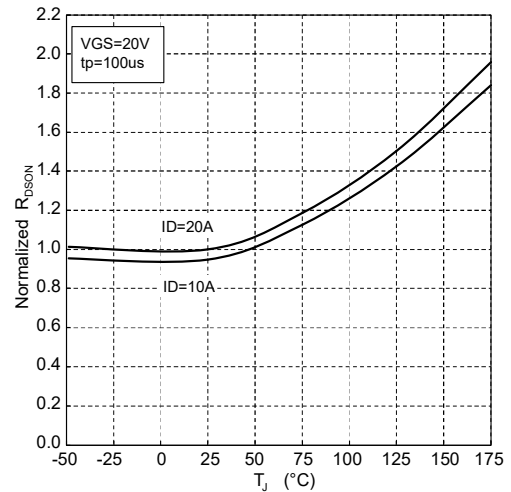


FIG. 5-Transfer Characteristic

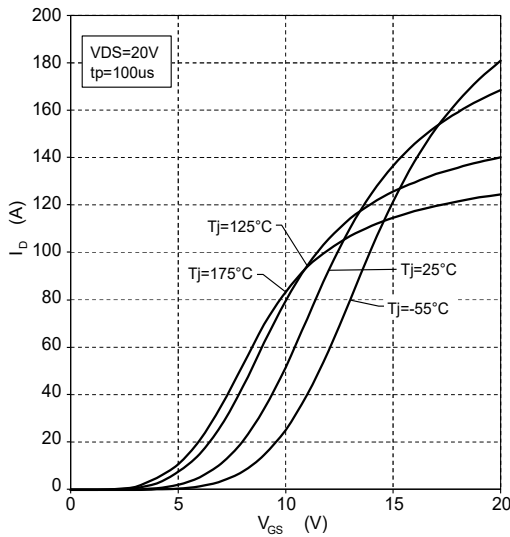


FIG. 6-Body Diode Characteristics

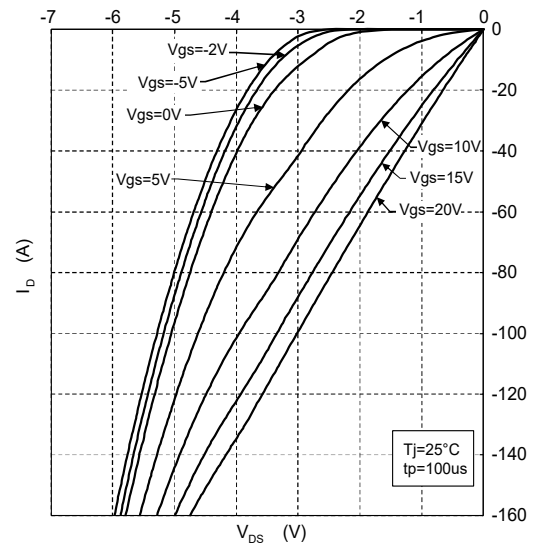


FIG. 7- $V_{GS(th)}$ vs T_J

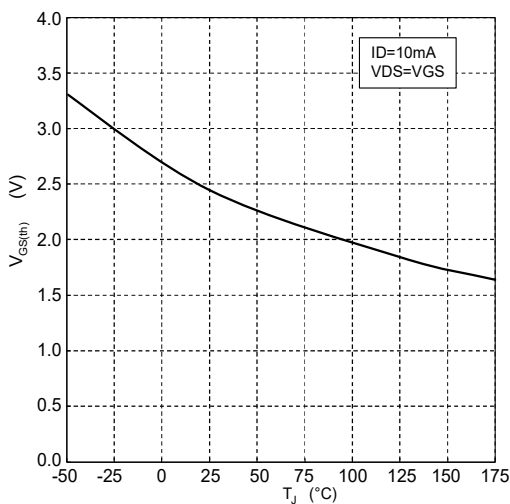
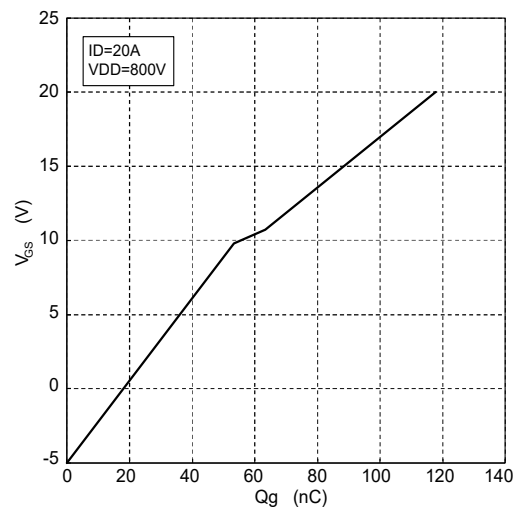


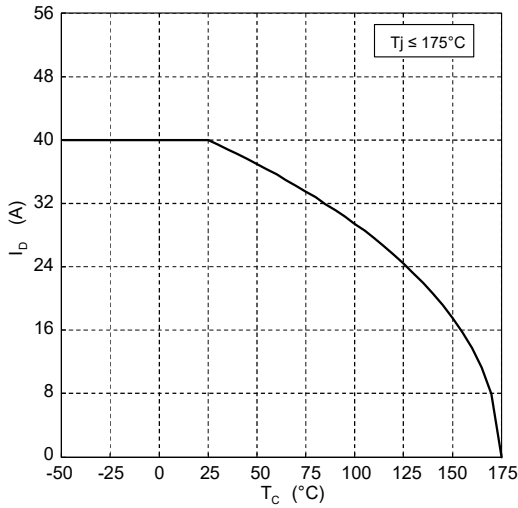
FIG. 8-Gate Charge Characteristics



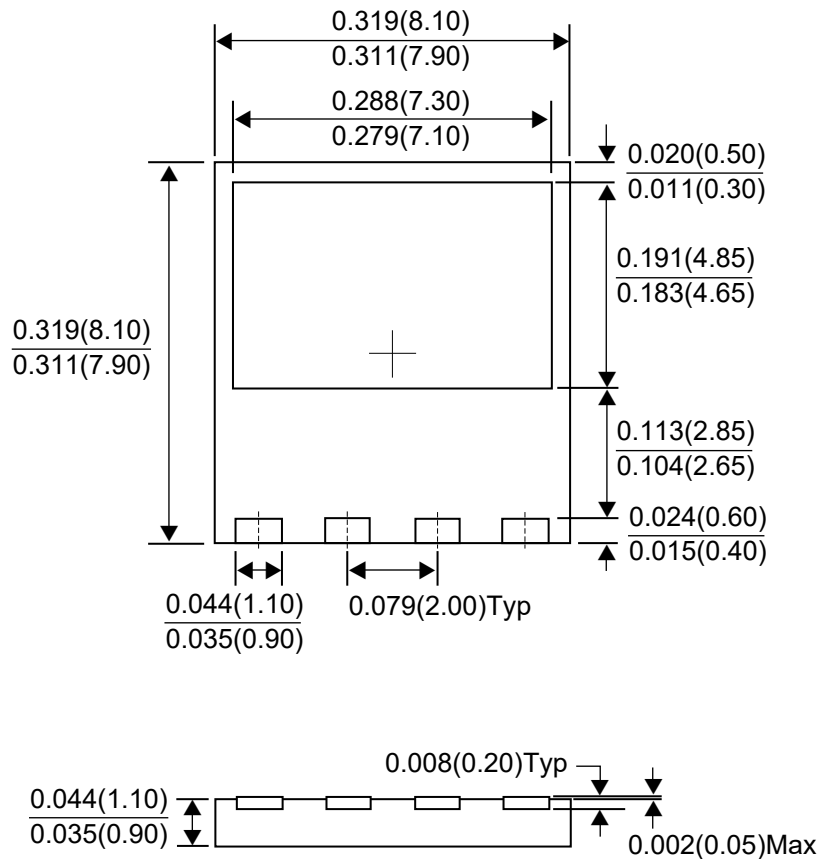


Typical Performance

FIG. 9- I_D vs T_C



Package Outline Dimensions



DFN8080

Dimensions in inches and (millimeters)



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