T3SNAL052

1200V SiC MOSFETs

BV_{DSS}	$R_{DS(ON)}$	I_D
1200 V	52 mΩ	63 A

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.

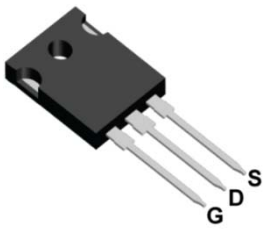
Features

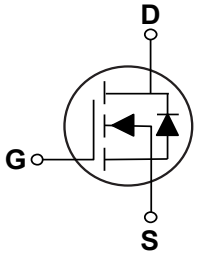
- $R_{DS(ON)} \leqq 52m\Omega @ V_{GS}=10V$
- Improved dv/dt Capability
- High Speed Switching
- Green Device Available

Benefits

- Lower Capacitance
- Higher System Efficiency
- Easy to Parallel

TO-247-3L Pin Configuration





Applications

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

Maximum Ratings T_J=25°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°C , T_J=175°C)	63	A
I_D	Drain Current – Continuous (T_C=100°C , T_J=175°C)	47	A
I_{DM}	Drain Current – Pulsed (T_C=25°C) (NOTE 1)	160	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	400	mJ
P_D	Power Dissipation (T_C=25°C)	322	W
T_J	Operating Junction Temperature Range	-55 to 175	°C
T_{STG}	Storage Temperature Range	-55 to 175	°C
Marking Code		SNAL052	

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	40	°C/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	0.466	°C/W

Electrical Characteristics (T_J=25°C, unless otherwise noted)

Off Characteristics

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

On Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=20V , I_D=40A	---	---	52	mΩ
		V_{GS}=20V , I_D=20A	---	---	45	
		V_{GS}=20V , I_D=40A , T_J=125°C	---	56	---	
		V_{GS}=20V , I_D=40A , T_J=175°C	---	73	---	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D=10mA	2.0	---	4.0	V
		V_{GS}=V_{DS} , I_D=10mA , T_J=125°C	---	1.8	---	
		V_{GS}=V_{DS} , I_D=10mA , T_J=175°C	---	1.6	---	
gfs	Transconductance	V_{DS}=20V , I_D=40A	---	16	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	V_{DD}=800V , V_{GS}= -5/+20V , I_D=40A	---	118	---	nC
Q_{gs}	Gate-Source Charge		---	53	---	
Q_{gd}	Gate-Drain Charge		---	10	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=800V , R_G=2.5Ω , I_D=40A , V_{GS}= -5/+20V	---	15	---	nS
T_r	Rise Time		---	14	---	
$T_{d(off)}$	Turn-Off Delay Time		---	22	---	
T_f	Fall Time		---	14	---	
C_{iss}	Input Capacitance	V_{DS}=1000V , V_{GS}=0V , F=200kHz	---	3192	---	pF
C_{oss}	Output Capacitance		---	132	---	
C_{rss}	Reverse Transfer Capacitance		---	7	---	
E_{oss}	Coss Stored Energy		---	77	---	uJ
$E_{(on)}$	Turn-On Switching Energy	V_{DD}=800V , R_G=2.5Ω , I_D=40A , V_{GS}= -5/+20V	---	1087	---	uJ
$E_{(off)}$	Turn-Off Switching Energy		---	86	---	
$E_{(tot)}$	Total Switching Energy		---	1173	---	
R_g	Gate Resistance	V_{GS}=0V , V_{DS}=0V , F=1MHz	---	1.9	---	Ω

Electrical Characteristics (T_J=25°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°C	---	---	74	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=40A , V_R=800V , dI_F/dt=3.2A/ns	---	28	---	nS
Q_{rr}	Reverse Recovery Charge		---	284	---	nC
I_{RRM}	Peak Reverse Recovery Current		---	18	---	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°C

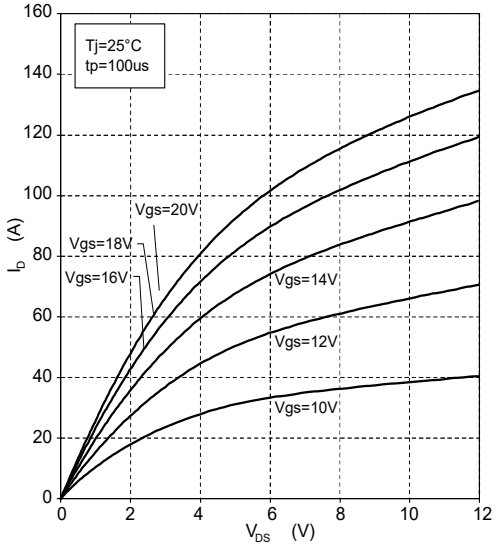
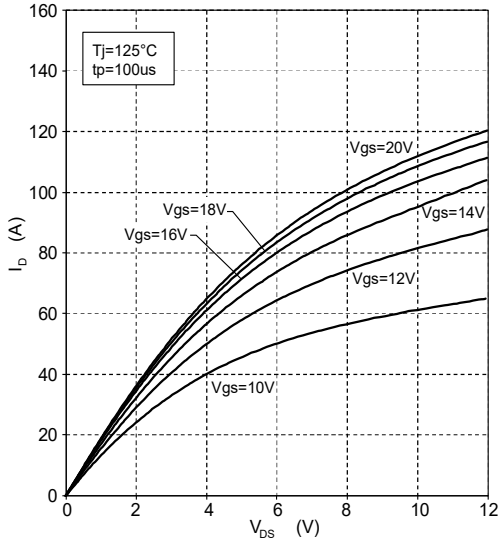


FIG. 2-Output Characteristics T_J=125°C



Typical Performance

FIG. 3-Output Characteristics T_J=175°C

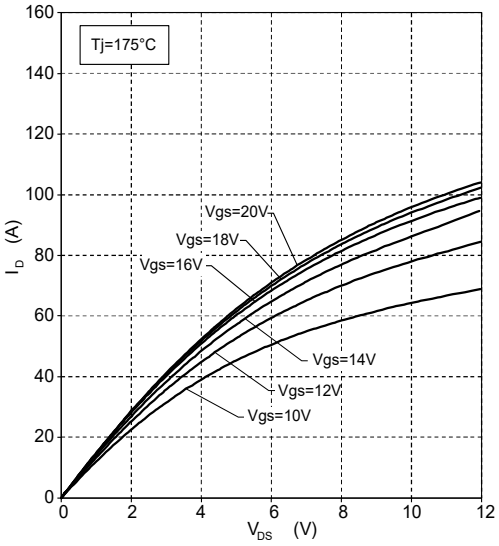


FIG. 4-Normalized $R_{DS(ON)}$ vs T_J

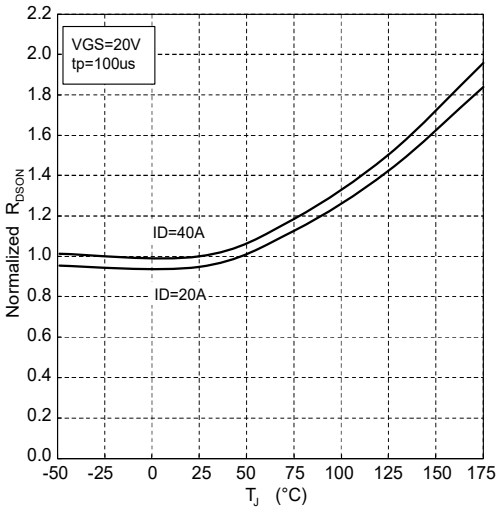


FIG. 5-Transfer Characteristic

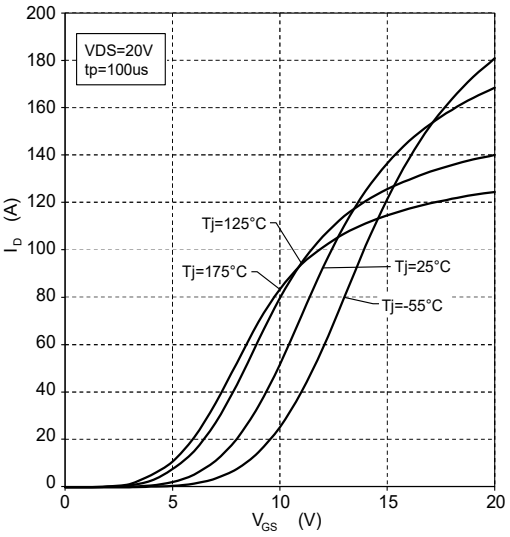


FIG. 6-Body Diode Characteristics

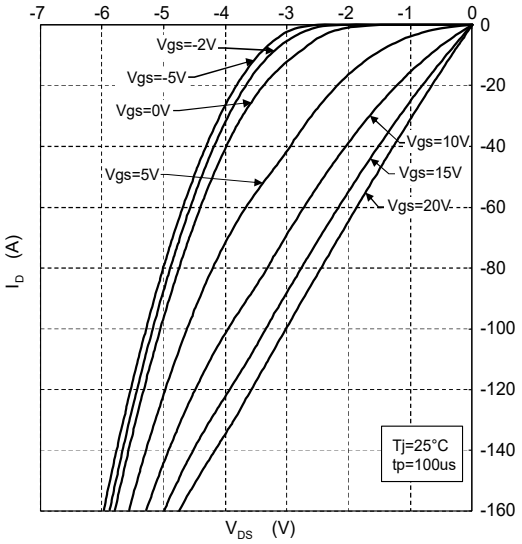


FIG. 7-$V_{GS(th)}$ vs T_J

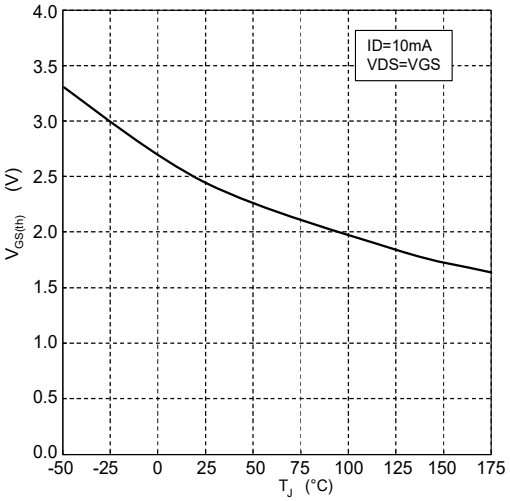
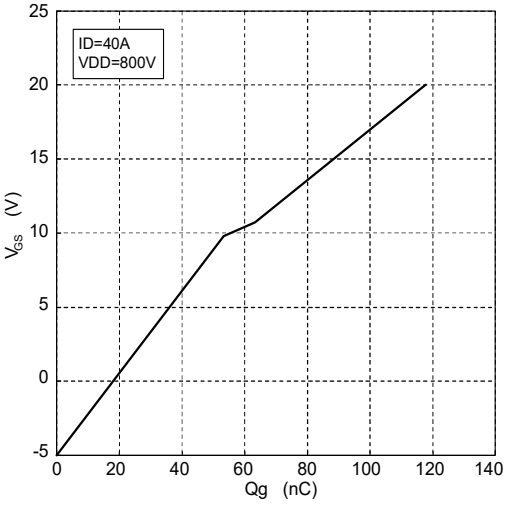
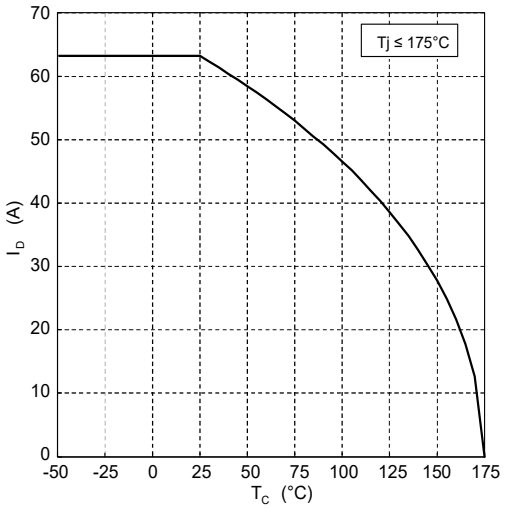


FIG. 8-Gate Charge Characteristics

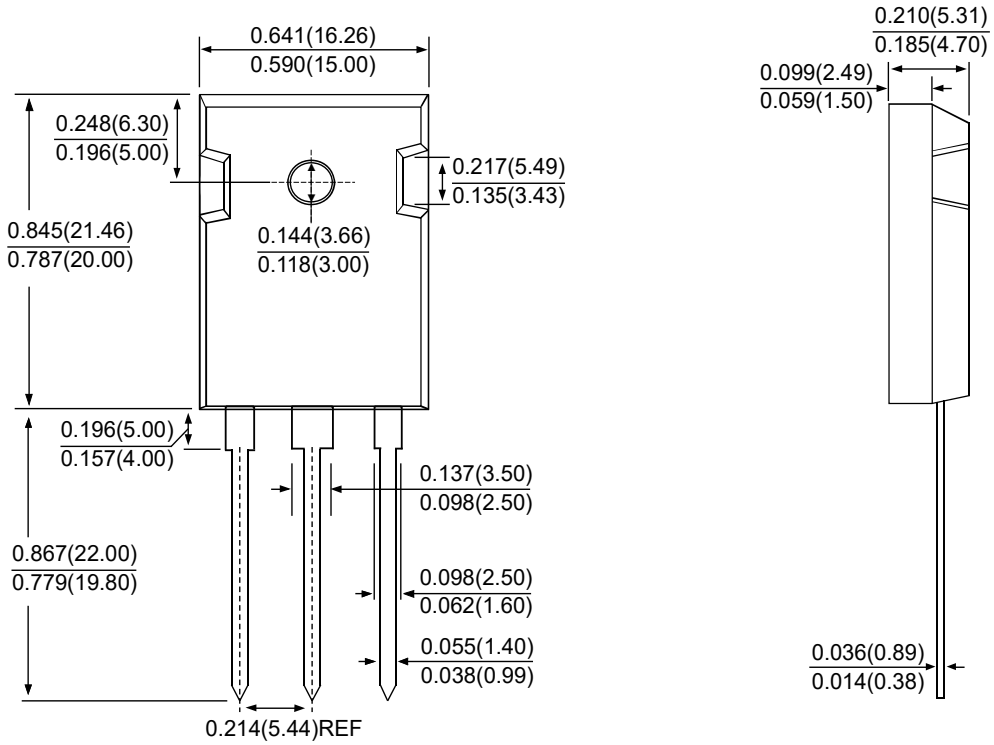


Typical Performance

FIG. 9-I_D vs T_C



Package Outline Dimensions



TO-247-3L

Dimensions in inches and (millimeters)

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