



T4SNAL028



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	28 m Ω	114 A

Features

- $R_{DS(ON)} \leq 28m\Omega @ V_{GS}=10V$
- Improved dv/dt Capability
- High Speed Switching
- Green Device Available

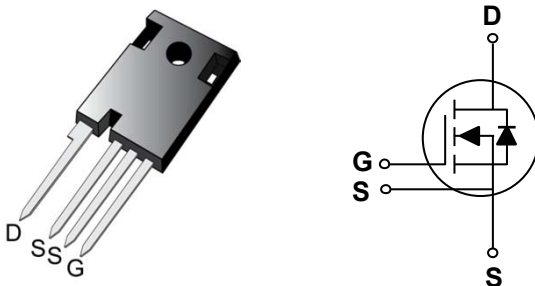
Benefits

- 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

TO-247-4L Pin Configuration



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 ($T_C=25^\circ\text{C}$, $T_J=175^\circ\text{C}$)	114	A
I_D	Drain Current – Continuous ($T_C=100^\circ\text{C}$, $T_J=175^\circ\text{C}$)	84	A
I_{DM}	Drain Current – Pulsed ($T_C=25^\circ\text{C}$) (NOTE 1)	250	A
EAS	Single Pulse Avalanche Energy (NOTE 2)	800	mJ
P_D	Power Dissipation ($T_C=25^\circ\text{C}$)	556	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		SNAL028	

Thermal Characteristics

Symbol	Parameter	Rating	Unit
$R_{\theta JA}$	Thermal Resistance Junction to Ambient	40	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	0.27	$^\circ\text{C}/\text{W}$



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	$V_{GS}=0V, I_D=1mA$	1200	---	---	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=1200V, V_{GS}=0V$	---	---	1	uA
		$V_{DS}=1200V, V_{GS}=0V, T_J=175^{\circ}\text{C}$	---	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	$V_{GS}=20V, I_D=50A$	---	---	28	mΩ
		$V_{GS}=20V, I_D=25A$	---	---	23	
		$V_{GS}=20V, I_D=50A, T_J=125^{\circ}\text{C}$	---	30	---	
		$V_{GS}=20V, I_D=50A, T_J=175^{\circ}\text{C}$	---	38	---	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=15mA$	2	---	4	V
		$V_{GS}=V_{DS}, I_D=15mA, T_J=125^{\circ}\text{C}$	---	2.7	---	
		$V_{GS}=V_{DS}, I_D=15mA, T_J=175^{\circ}\text{C}$	---	2.5	---	
gfs	Transconductance	$V_{DS}=20V, I_D=50A$	---	21	---	S

Dynamic and switching Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Q_g	Total Gate Charge	$V_{DD}=800V, V_{GS}=-5/+20V, I_D=50A$	---	233	---	nC
Q_{gs}	Gate-Source Charge		---	80	---	
Q_{gd}	Gate-Drain Charge		---	19	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=800V, R_G=2.5\Omega, I_D=50A, V_{GS}=-5/+20V$	---	20	---	nS
T_r	Rise Time		---	6	---	
$T_{d(off)}$	Turn-Off Delay Time		---	35	---	
T_f	Fall Time		---	19	---	
C_{iss}	Input Capacitance	$V_{DS}=1000V, V_{GS}=0V, F=200kHz$	---	6676	---	pF
C_{oss}	Output Capacitance		---	259	---	
C_{rss}	Reverse Transfer Capacitance		---	12	---	
E_{oss}	Coss Stored Energy		---	149	---	
$E_{(on)}$	Turn-On Switching Energy	$V_{DD}=800V, R_G=2.5\Omega, I_D=50A, V_{GS}=-5/+20V, L=273uH$	---	605	---	uJ
$E_{(off)}$	Turn-Off Switching Energy		---	125	---	
$E_{(tot)}$	Total Switching Energy		---	730	---	
R_g	Gate Resistance	$V_{GS}=0V, V_{DS}=0V, F=1MHz$	---	0.9	---	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	$V_{GS} = -5V, T_C = 25^\circ\text{C}$	---	---	127	A
V_{SD}	Diode Forward Voltage	$V_{GS} = -5V, I_S = 25A$	---	3.7	---	V
t_{rr}	Reverse Recovery Time	$V_{GS} = -5V, I_S = 50A, V_R = 800V, di_F/dt = 5.9A/ns$	---	36	---	nS
Q_{rr}	Reverse Recovery Charge		---	551	---	nC
I_{RRM}	Peak Reverse Recovery Current		---	28	---	A

NOTES :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. $I_{AS}=40A, V=50V, L=1.0mH$.

Typical Performance

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

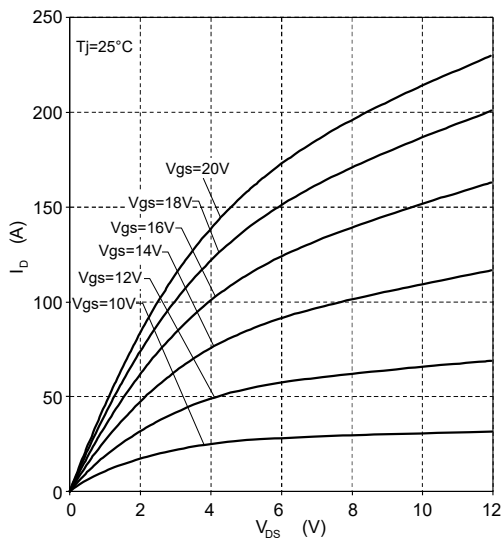
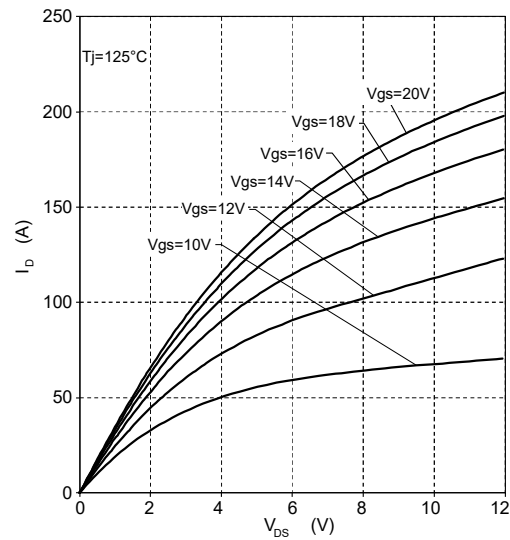


FIG. 2-Output Characteristics $T_J=125^\circ\text{C}$





Typical Performance

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

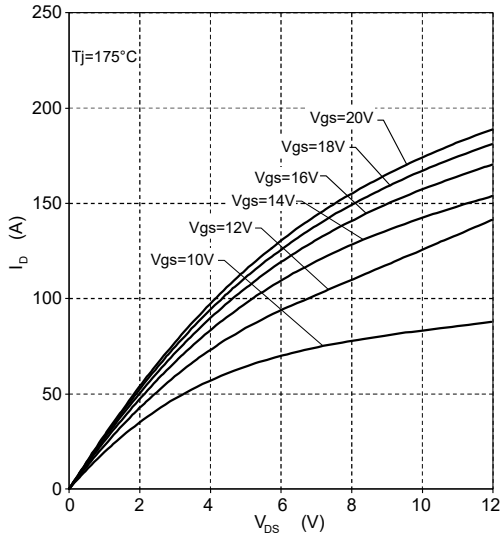


FIG. 4-Normalized $R_{DS(ON)}$ vs T_J

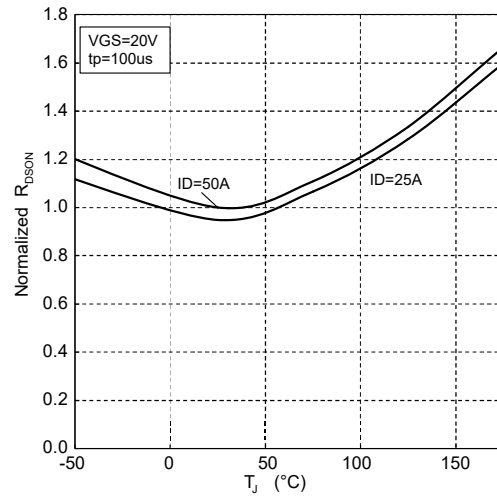


FIG. 5-Transfer Characteristic

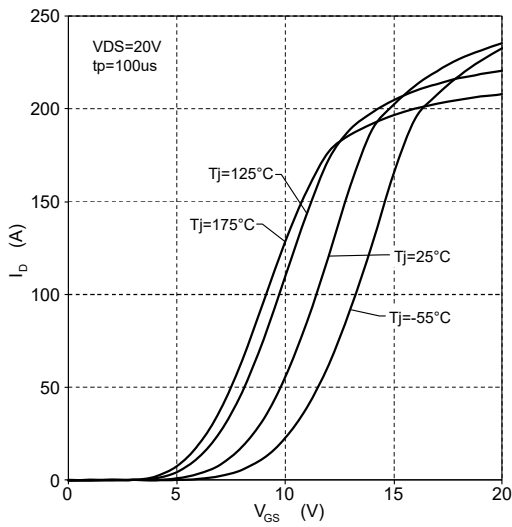


FIG. 6-Body Diode Characteristics

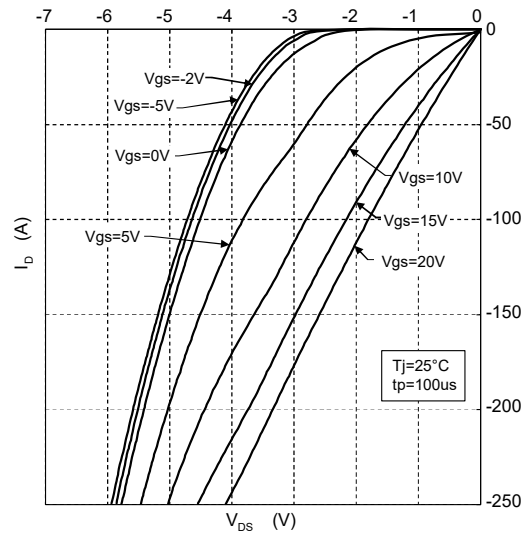


FIG. 7- $V_{GS(th)}$ vs T_J

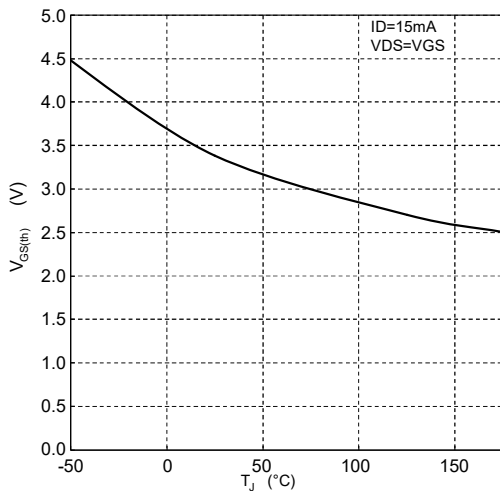
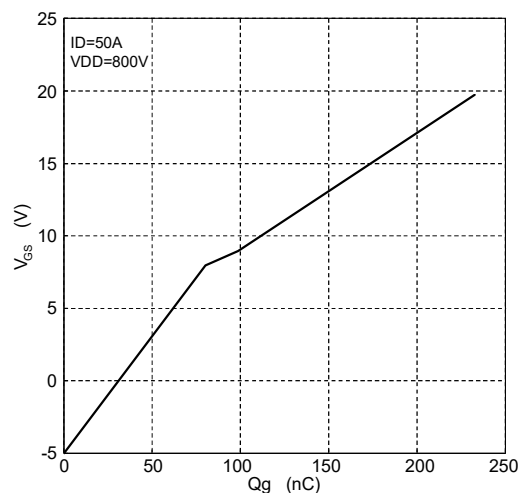


FIG. 8-Gate Charge Characteristics





Typical Performance

FIG. 9- I_D vs T_C

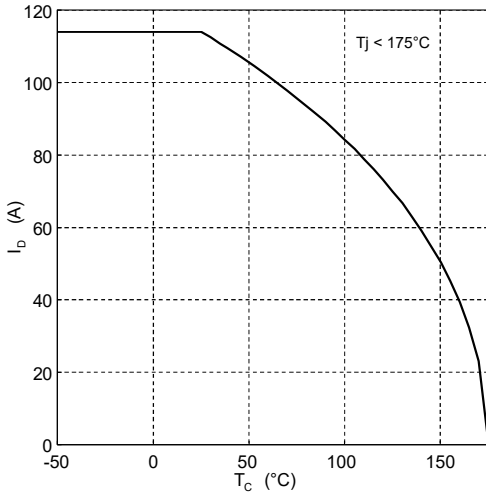


FIG. 10-Transient Thermal Impedance (Junction to Case)

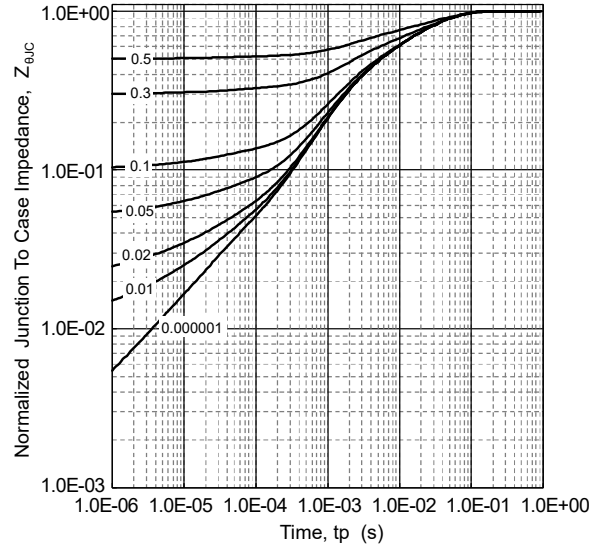
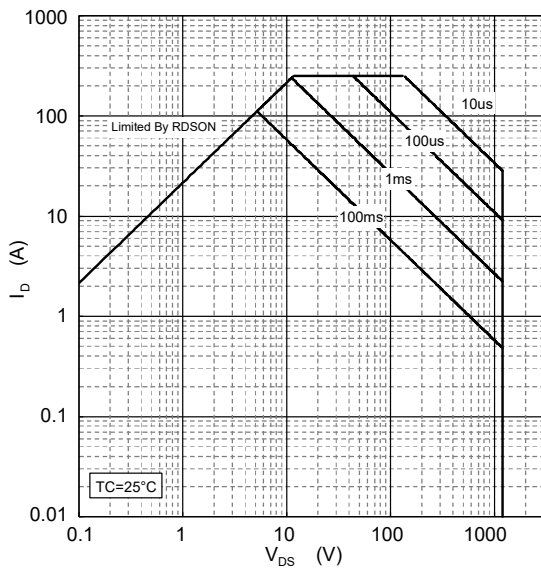
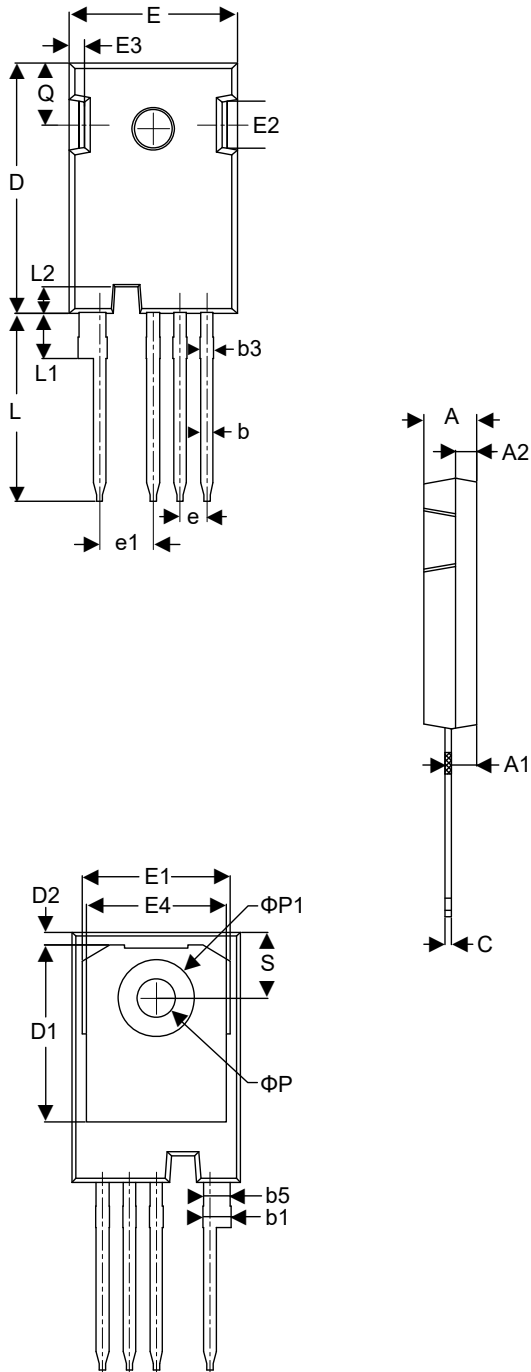


FIG. 11-Safe Operating Area





Package Outline Dimensions



Symbol	Dimensions in millimeters		Dimensions in inches	
	Min.	Max.	Min.	Max.
A	4.83	5.21	0.190	0.206
A1	2.29	2.54	0.090	0.100
A2	1.91	2.16	0.075	0.086
b	1.07	1.33	0.042	0.053
b1	2.39	2.94	0.094	0.116
b3	1.07	1.60	0.042	0.063
b5	2.39	2.69	0.094	0.106
C	0.55	0.68	0.021	0.027
D	23.30	23.60	0.917	0.930
D1	16.25	17.65	0.639	0.695
D2	0.95	1.25	0.037	0.050
E	15.75	16.13	0.620	0.636
E1	13.10	14.15	0.515	0.558
E2	3.68	5.10	0.144	0.201
E3	1.00	1.90	0.039	0.075
E4	12.38	13.43	0.487	0.529
e	2.54 BSC		0.100 BSC	
e1	5.08 BSC		0.200 BSC	
L	17.31	17.82	0.681	0.702
L1	3.97	4.37	0.156	0.173
L2	2.35	2.65	0.092	0.105
ΦP	3.51	3.65	0.138	0.144
ΦP1	7.19 REF		0.284 REF	
Q	5.49	6.00	0.216	0.237
S	6.04	6.30	0.237	0.249

TO-247-4L



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