

SCQH025N120L4

1200V 25mΩ N-Channel SiC Power MOSFET

Features

- Typical on-Resistance: $R_{DS(on)}=25m\Omega$ (typ.)
- High Blocking Voltage
- 100% Avalanche Test
- Good Stability and Uniformity with High E_{AS}

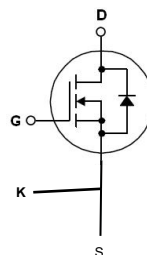
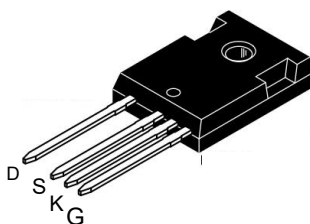
Description

The SCQH025N120L4 is a high blocking voltage N-Channel SiC power MOSFET. This device provide excellent performance for high voltage power supplies or pulse circuits.

Applications

- Solar Inverters
- High Voltage DC/DC Converters
- Motor Drivers
- Switch Mode Power Supplies

Package Type & Internal Circuit



Absolute Maximum Ratings @ $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter		Ratings	Unit
V _{DSS}	Drain to Source Voltage		1200	V
V _{GSS}	Gate to Source Voltage		-10/+25	V
V _{GSop}	Recommended operation Values of Gate –Source Voltage		-5/+20	V
I _D	Drain Current	T _C =25°C	90	A
		T _C =100°C	60	A
I _{DM}	Pulsed Drain Current (Note1)		240	A
P _D	Maximum Power Dissipation	T _C =25°C	500	W
	Derate above 25°C		3.33	W/°C
E _{AS}	Single Pulsed Avalanche Energy (Note 2)		300	mJ
T _J	Operating Junction Temperature Range		-40~+175	°C
T _{STG}	Storage Temperature Range		-40~+175	°C

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$	Thermal Resistance, Junction to case	0.3	$^\circ\text{C/W}$
$R_{th(J-A)}$	Thermal Resistance, Junction to Ambient	40	$^\circ\text{C/W}$

**Electrical Characteristics** @ $T_c=25\text{ }^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=100\mu A$	1200	-	-	V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=15mA$	1.9	2.4	-	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS}=20V, I_D=50A$	-	25	45	m Ω
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=V_{DSS}, V_{GS}=0V$	-	-	100	μA
I_{GSS}	Gate to Source Leakage Current	$V_{GS}=V_{GSS}, V_{DS}=0V$	-	-	± 500	nA

D-S Diode Characteristics and Maximum Rating @ $T_c=25\text{ }^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS}=0V, I_S=25A$	-	5.4	-	V
t_{rr}	Reverse Recovery Time	$V_{GS}=0V, I_S=25A,$ $di/dt=-1000A/\mu s$	-	55	-	ns
Q_{rr}	Reverse Recovery Charge		-	220	-	nC

Switching Characteristics @ $T_c=25\text{ }^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$I_D=50A,$ $V_{DD}=800V,$ $R_G=2.5\Omega$ $V_{GS}=-5/20V,$ (Note 3)	-	16	-	ns
t_r	Turn-on Rise Time		-	16.2	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	33	-	ns
t_f	Turn-off Fall Time		-	7.8	-	ns
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=1000V,$ $f=1.0MHz$	-	3600	-	pF
C_{oss}	Output Capacitance		-	240	-	pF
C_{rss}	Reverse Transfer Capacitance		-	16	-	pF
Q_g	Total Gate Charge	$I_D=50A,$ $V_{DD}=800V$ $V_{GS}=-5V/20V$ (Note 3)	-	195	-	nC
Q_{ge}	Gate to Source Charge		-	54	-	nC
Q_{gd}	Gate to Drain Charge		-	29	-	nC

Note:

1. Repetitive rating: pulse-width limited by maximum junction temperature
2. $V_{DD}=100V, L=10mH, V_{clamp}=1600V, V_G=10V, I_D=23.0A$
3. Essentially independent of operating temperature typical characteristics

Typical Performance Characteristics

Fig. 1. Typical on-Resistance Characteristics

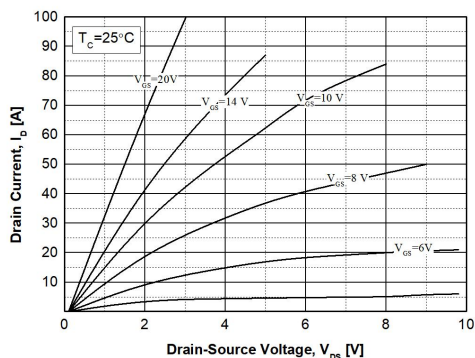


Fig. 2. Normalized On-Resistance vs. Drain Current and Gate Voltage

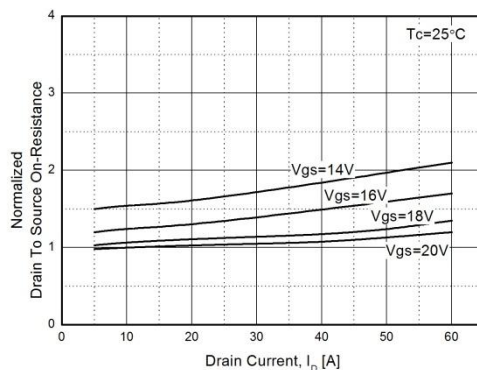


Fig. 3. Normalized On-Resistance vs. Junction Temperature

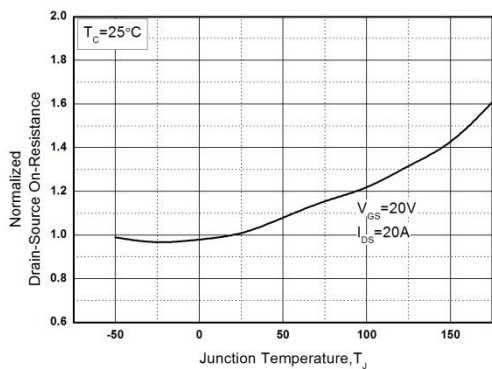


Fig. 4. On-Resistance vs. Gate-to-source Voltage

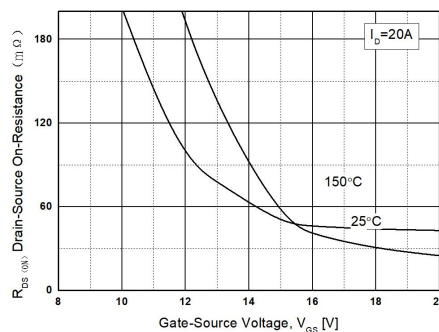


Fig. 5. Transfer Characteristics

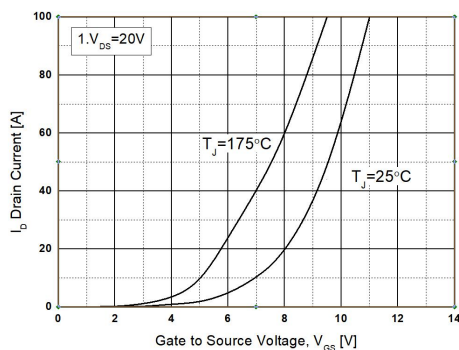
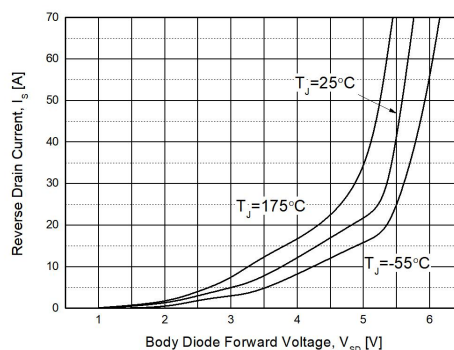


Fig. 6. Source-to-Drain Diode Forward Voltage vs. Source Current



Typical Performance Characteristics

Fig. 7. Gate Charge Characteristics

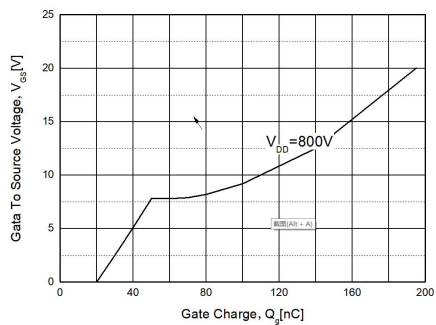


Fig. 8. Characteristics vs. Drain-to-Source Voltage

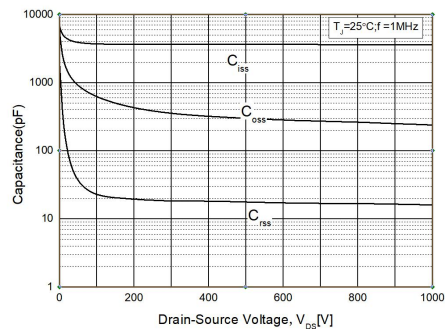
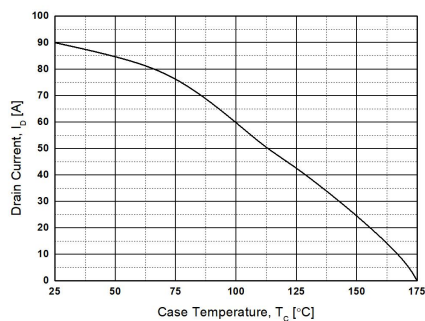


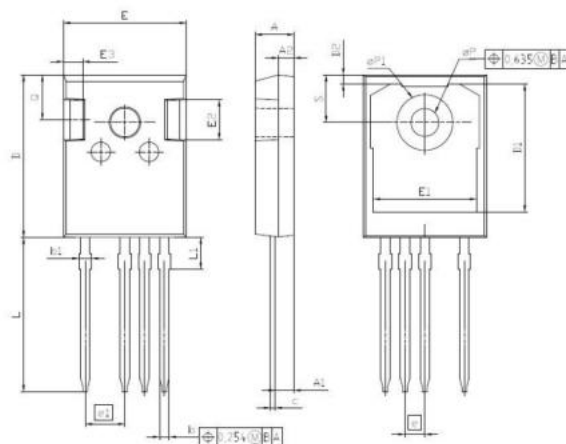
Fig. 9. Maximum Drain Current vs. Temperature



Package Dimensions

TO-247

(Dimensions in Millimeters)



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.83	5.21	0.190	0.205
A1	2.29	2.54	0.090	0.100
A2	1.90	2.16	0.075	0.085
b	1.07	1.33	0.042	0.052
b1	1.10	1.70	0.043	0.067
c	0.50	0.70	0.020	0.028
D	20.80	21.10	0.819	0.831
D1	16.25	17.65	0.640	0.695
D2	0.95	1.35	0.037	0.053
E	15.70	16.13	0.618	0.635
E1	13.10	14.15	0.516	0.557
E2	3.68	5.10	0.145	0.201
E3	1.00	2.60	0.039	0.102
e	2.54 (BSC)		0.100 (BSC)	
e1	5.08		0.200	
N	4		4	
L	19.72	20.32	0.776	0.800
L1	4.02	4.40	0.158	0.173
aP	3.50	3.70	0.138	0.146
aP1	7.00	7.40	0.276	0.291
Q	5.49	6.00	0.216	0.236
S	6.04	6.30	0.238	0.248

DISCLAIMER:

The products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any product can reasonably be expected to result in a personal injury. Seller's customers using or selling seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.

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