

SC040N120H7

68 Amps, 1200 Volts N-Channel Sic Power MOSFET

Features

- 68A, 1200V, $R_{DS(ON)MAX}=53m\ \Omega$ @ $V_{GS}=18V/33.3A$
- High Blocking Voltage with low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive

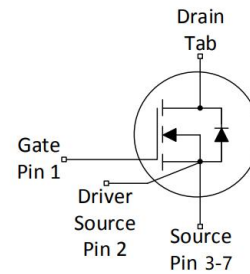
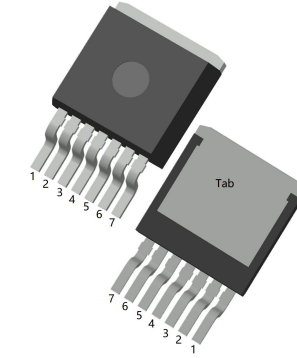
Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Renewable Energy
- EV Battery Chargers
- High Voltage DC/DC Converters
- Switch Mode Power Supplies

TO-263-7H



Absolute Maximum Ratings ($T_c=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Value	UNIT	Test Conditions
Drain-Source Voltage	V_{DSmax}	1200	V	$V_{GS}=0V, I_{DS}=100\mu A$
Gate-Source Voltage (dynamic)	V_{GSmax}	-8/+22		Absolute maximum values
Gate-Source Voltage (static)	V_{GSop}	-4/+18		Recommended operational values
Continuous Drain Current	I_D	68	A	$V_{GS}=18V, T_c=25^\circ\text{C}$
		49		$V_{GS}=18V, T_c=100^\circ\text{C}$
Pulsed Drain Current	$I_{D(pulse)}$	100	A	Pulse width t_p limited by T_{Jmax}
Power Dissipation	P_D	340	W	$T_c=25^\circ\text{C}, T_J=150^\circ\text{C}$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +175	$^\circ\text{C}$	

Thermal Characteristics

Parameter	Symbol	SC040N120H7	Units
Maximum Junction-to-Case	R_{thJC}	0.44	$^\circ\text{C}/\text{W}$

Electrical Characteristics ($T_c=25^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=100\mu A$	1200	—	—	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=1200V, V_{GS}=0V$	—	1	100	μA
Gate-Body Leakage Current, Forward	I_{GSSF}	$V_{GS}=22V, V_{DS}=0V$	—	10	250	nA
Gate-Body Leakage Current, Reverse	I_{GSSR}	$V_{GS}=-8V, V_{DS}=0V$	—	10	250	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=9.5mA$	1.9	2.6	4.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=18V, I_D=33.3A$	—	40	53	m Ω
		$V_{GS}=18V, I_D=33.3A, T_J=175^\circ\text{C}$	—	65	—	
Input Capacitance	C_{iss}	$V_{DS}=1000V,$	—	2070	—	pF
Output Capacitance	C_{oss}	$V_{GS}=0V,$	—	112	—	pF
Reverse Transfer Capacitance	C_{rss}	$f=1.0\text{MHz},$	—	11	—	pF
Coss Stored Energy	E_{OSS}	$V_{AC}=25mV$	—	66	—	μJ
Turn-On Delay Time	$t_{d(on)}$	$V_{DS}=800V, V_{GS}=-4V/18V,$ $I_D=33A, R_g=2.5\Omega, R_L=20\Omega$	—	17	—	ns
Turn-On Rise Time	t_r		—	58	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	26	—	ns
Turn-Off Fall Time	t_f		—	15	—	ns
Turn-On Switching Energy	E_{ON}	$V_{DS}=800V, V_{GS}=-4V/18V$	—	1410	—	μJ
Turn-Off Switching Energy	E_{OFF}	$I_D=33A, R_g=2.5\Omega, L=100\mu H$	—	750	—	μJ
Internal Gate Resistance	R_G	$f=1\text{MHz}, V_{AC}=25mV$	—	4.9	—	Ω
Total Gate Charge	Q_g	$V_{DS}=800V, I_D=33A,$ $V_{GS}=-4V/18V$	—	121	—	nC
Gate-Source Charge	Q_{GS}		—	34	—	
Gate-Drain Charge	Q_{gd}		—	20	—	
Reverse Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=-4V, I_{SD}=20A$	—	4.5	—	V
		$V_{GS}=-4V, I_{SD}=20A, T_J=175^\circ\text{C}$	—	4.2	—	
Continuous Diode Forward Current	I_S	$T_C=25^\circ\text{C}$	—	—	51	A
Reverse Recover Time	t_{rr}	$V_R=800V, I_{SD}=33A$	—	38	—	ns
Reverse Recovery Charge	Q_{rr}		—	109	—	nc
Peak Reverse Recovery Current	I_{rrm}		—	5	—	A

RATING AND CHARACTERISTIC CURVES

Figure.1 Output Characteristics $T_j=25^\circ\text{C}$

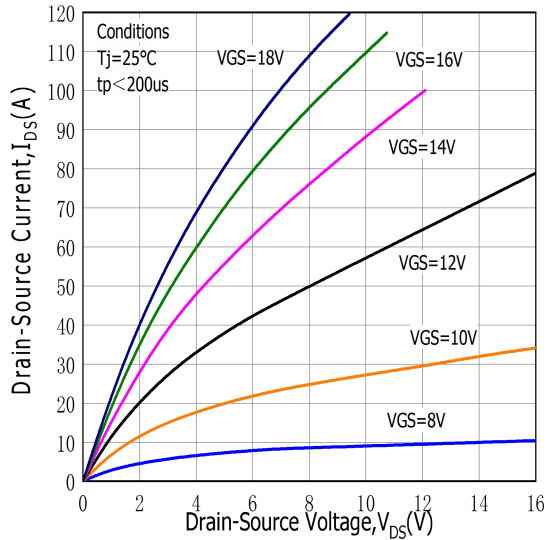


Figure.2 Output Characteristics $T_j=175^\circ\text{C}$

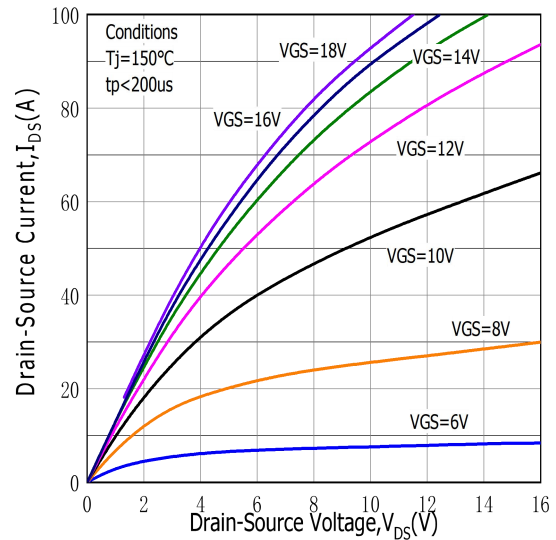


Figure.3 On-Resistance vs. Temperature

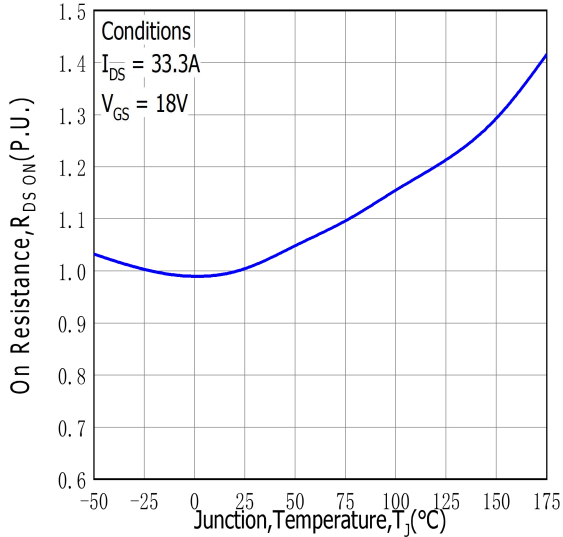


Figure.4 On-Resistance vs. Drain Current for Various Temperatures

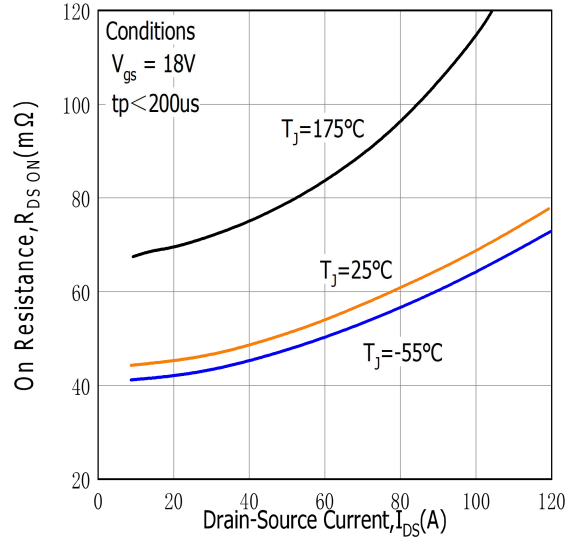


Figure.5 On-Resistance vs. Temperature for Various Gate Voltage

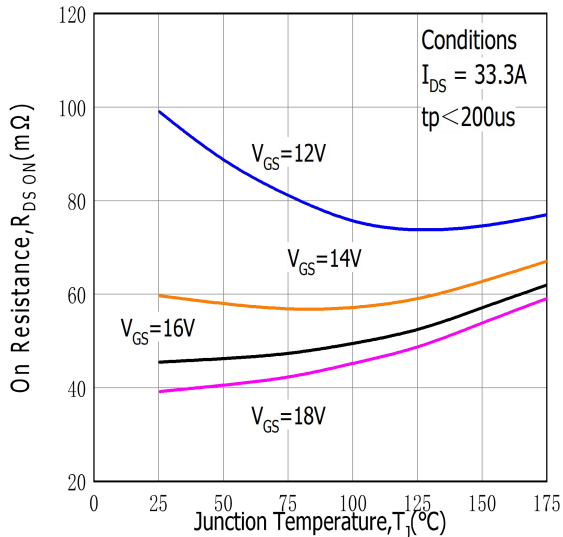


Figure.6 Transfer Characteristic for Various Junction Temperatures

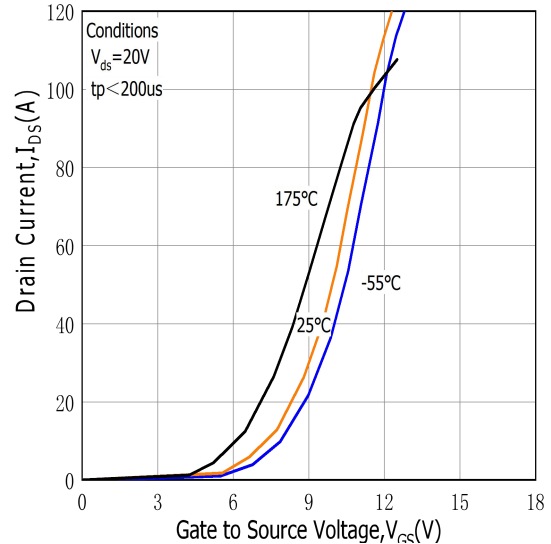


Figure.7 Body Diode Characteristic at 25°C

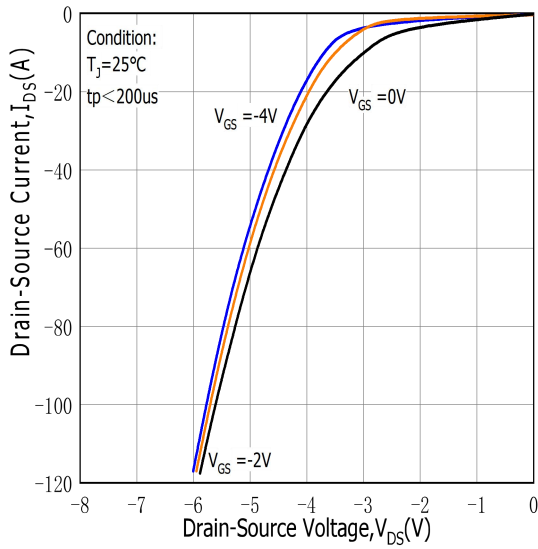


Figure.8 Body Diode Characteristic at 175°C

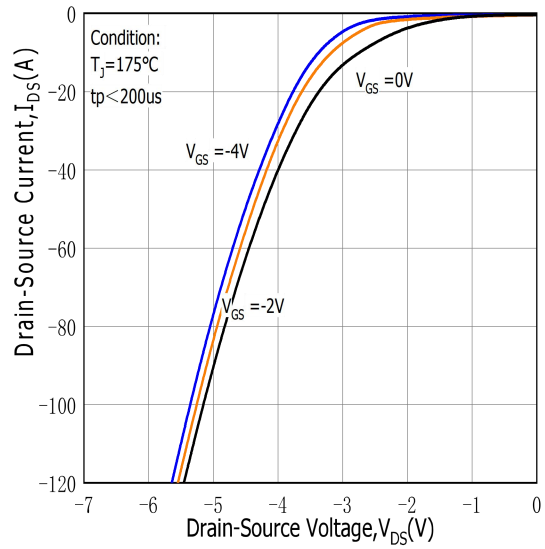


Figure.9 Threshold Voltage vs. Temperature

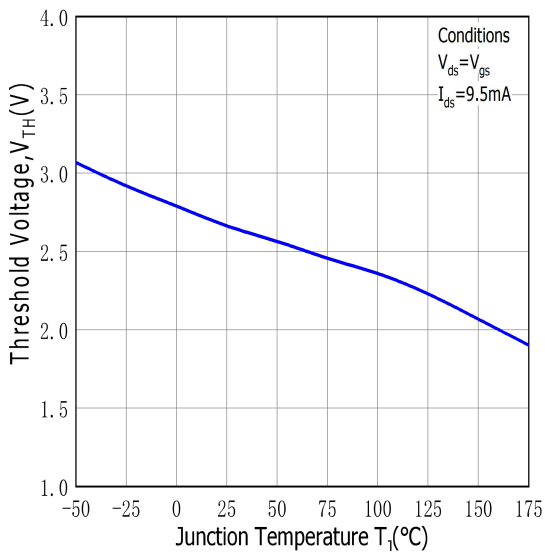


Figure.10 Gate Charge Characteristics

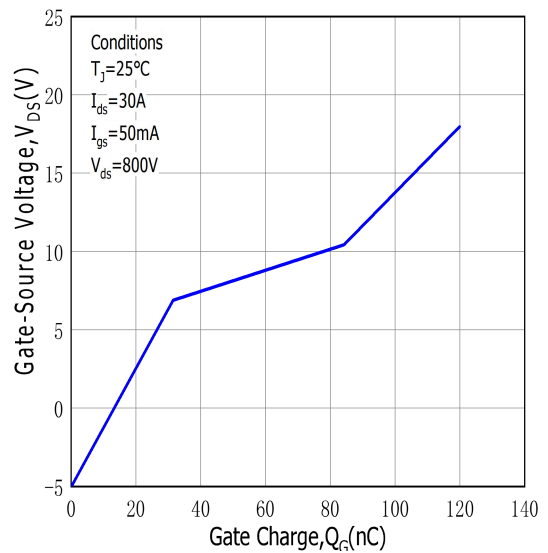


Figure.11 3rd Quadrant Characteristic at 25°C

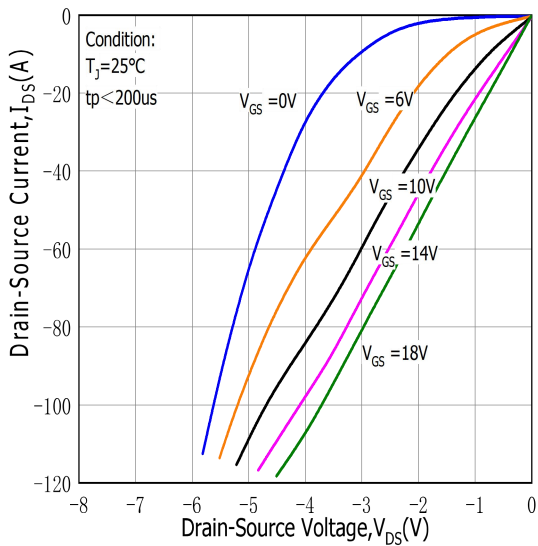


Figure.12 3rd Quadrant Characteristic at 175°C

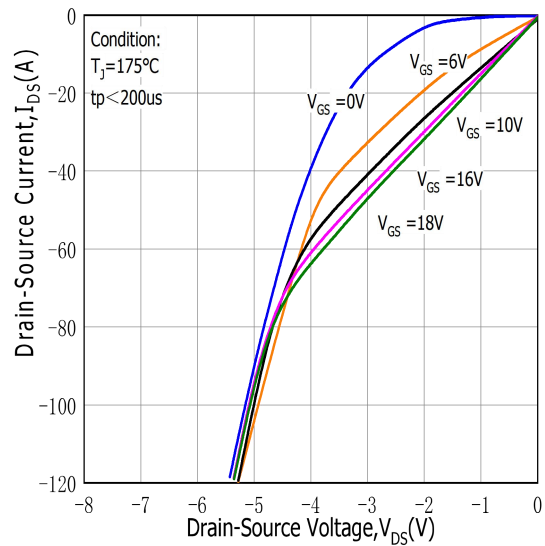


Figure.13 Capacitances vs. Drain-Source Voltage(0-200V)

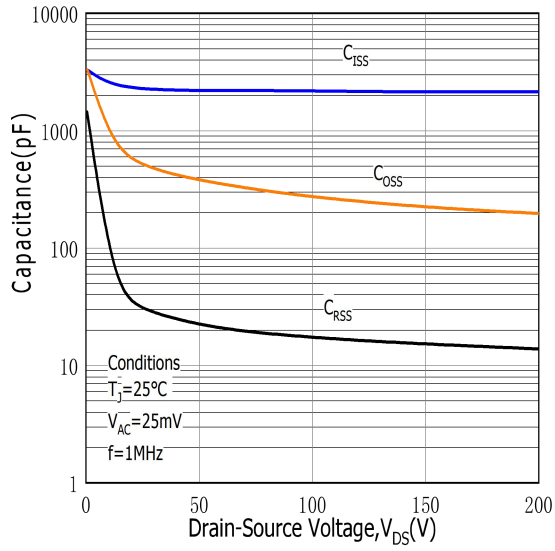
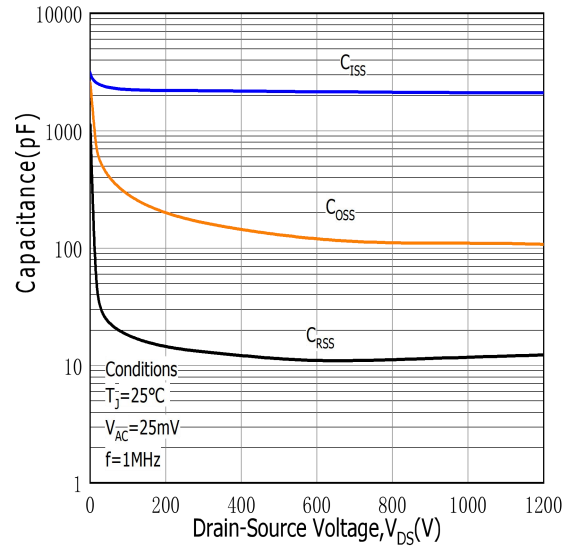
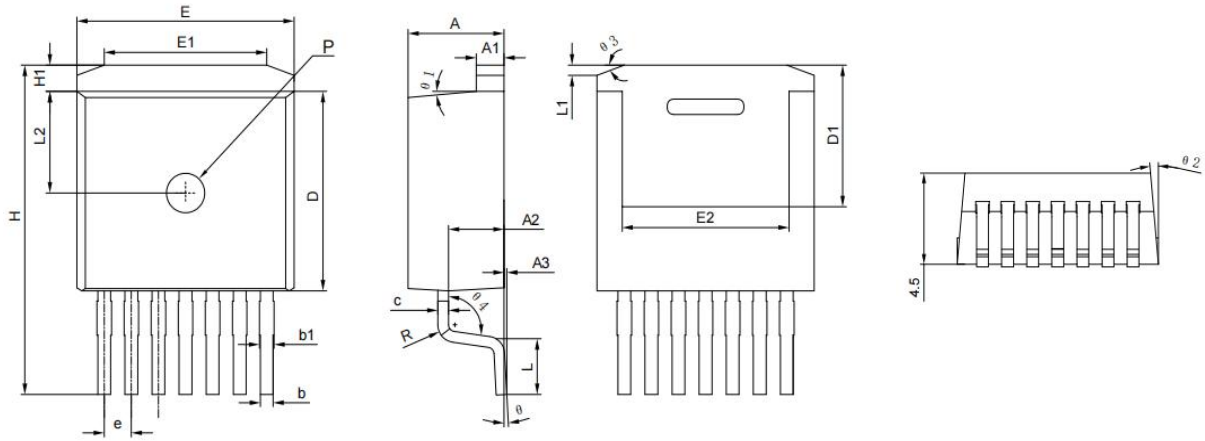


Figure.14 Capacitances vs. Drain-Source Voltage(0-1200V)



Package Outline: TO-263-7H



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.40	4.60	0.173	0.181
A1	1.25	1.40	0.049	0.055
A2	2.45	2.70	0.096	0.106
A3	0.05	0.20	0.002	0.008
b	0.50	0.70	0.020	0.028
b1	0.60	0.85	0.024	0.033
c	0.45	0.60	0.018	0.024
D	8.88	9.28	0.350	0.365
D1	6.25	6.65	0.246	0.262
E	9.18	10.28	0.361	0.405
E1	6.67	7.47	0.263	0.294
E2	7.67	7.97	0.302	0.314
e	1.27		0.050	
H	14.80	15.20	0.583	0.598
H1	1.10	1.30	0.043	0.051
L	2.35	2.75	0.093	0.108
L1	0.37	0.77	0.015	0.030
L2	4.48	4.78	0.176	0.188
θ	0°	5°	0°	5°
θ1	3°	7°	3°	7°
θ2	3°	7°	3°	7°
θ3	15°	25°	15°	25°
θ4	93°	100°	93°	100°
R	0.75	0.85	0.030	0.033
p	1.70	1.90	0.067	0.075