SEMICONDUCTOR

SC160N120D7L

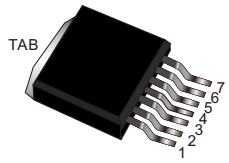
1200V 20A N-Channel SIC Power MOSFET

Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- High operating junction temperature capability
- Very fast and robust intrinsic body diode
- Kelvin gate input easing driver circuit design

Product Summary			
V_{DS}	$R_{DS(on)}$(mΩ)Typ	I_D(A)	Qg(Typ)
1200V	160 @ 15V 10A	20	26nc

TO-263-7L



Mechanical Data

- Case:TO-263-7L Package

Application

- Switch mode power supplies
- Renewable energy
- Motor drives
- High voltage DC/DC converters

Block Diagram

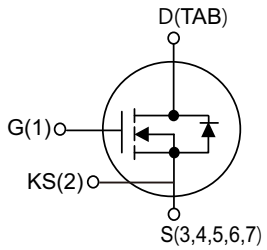


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	1200	V
Gate-Source Voltage(Max)		$V_{GS(max)}$	-8/+19	V
Recommend Gate-Source Voltage		V_{GSop}	-4/+15	V
Continuous Drain Current	T_C=25°C	I_D	20	A
	T_C=100°C		12	
Pulsed Drain Current (Note 1)		I_{DM}	35	A
Power Dissipation	T_C=25°C	P_D	108	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55 ~ +175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	SC160N120D7L	Unit
Thermal resistance Junction to Case	$R_{\theta JC}$	1.4	°C/W
Thermal resistance Junction to Ambient	$R_{\theta JA}$	40	°C/W

Table 3. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=100μA	1200	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=1200V,V_{GS}=0V	-	1	100	μA
Gate- Source Leakage Current	I_{GSS}	V_{GS}=-8 to 19V,V_{DS}=0V	-	-	250	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=2.5mA	-	2.5	-	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=15V,I_D=10A,T_J=25°C	-	160	208	mΩ
		V_{GS}=15V,I_D=10A,T_J=175°C	-	272	-	
Gate Resisitance	R_G	f=1MHz	-	5.0	-	Ω
Dynamic Characteristics						
Input Capacitance	C_{ISS}	V_{DS}=1000V,V_{GS}=0V, f=1MHz,V_{AC}=25mV	-	715	-	pF
Output Capacitance	C_{OSS}		-	42	-	pF
Reverse Transfer Capacitance	C_{RSS}		-	4	-	pF
Coss stored energy	E_{OSS}	V_{DS}=1000V,f=1MHz	-	23	-	μJ
Turn-on switching energy	E_{ON}	V_{DS}=800V,I_D=10A,V_{GS}=-4/15V, R_G=2.5Ω,Load=300μH,T_J=175°C	-	100	-	μJ
Turn-off switching energy	E_{OFF}		-	17	-	μJ
Turn-On Delay Time	td(on)	V_{DS}=800V,I_D=20A V_{GS}=-4/15V,R_G=2.5Ω, Load=300μH	-	11	-	ns
Turn-On Rise Time	t_R		-	8	-	ns
Turn-Off Delay Time	td(off)		-	14	-	ns
Turn-Off Fall Time	tf		-	9	-	ns
Total Gate Charge	Q_G	V_{DD}=800V,I_D=10A, V_{GS}=-4/15V	-	26	-	nC
Gate-Source Charge	Q_{GS}		-	12	-	nC
Gate-Drain Charge	Q_{GD}		-	6	-	nC
Drain-Source Diode Characteristics and Maximum Ratings(Note 2)						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=-4V,I_S=20A	-	3.5	-	V
Continuous Diode Forward Current	I_S	V_{GS}=0V	-	20	-	A
Reverse Recovery Time	trr	V_R=800V,di/dt=1900A/μs; I_{SD}=10A,V_{GS}=-4V,T_J=175°C	-	7	-	ns
Recovered charge	Qrr		-	33	-	nC
Peak reverse recovery current	Irrm		-	9	-	A

Notes: 1 RepetitiveRating Pulse width limited by maximum junction temperature

2 Pulse Test: Pulse width ≤300μS,Duty cycle≤2%

Typical Characteristics Diagrams

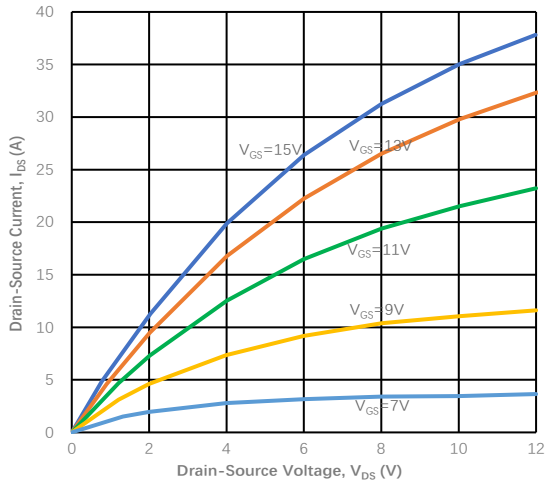


Figure 1

Output Characteristics (T_J=25°C)

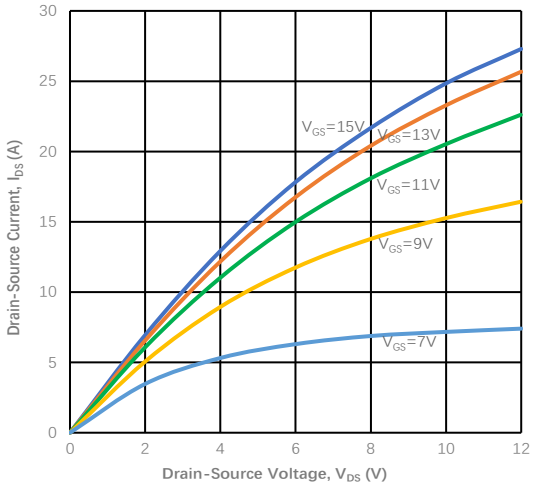


Figure 2

Output Characteristics (T_J=175°C)

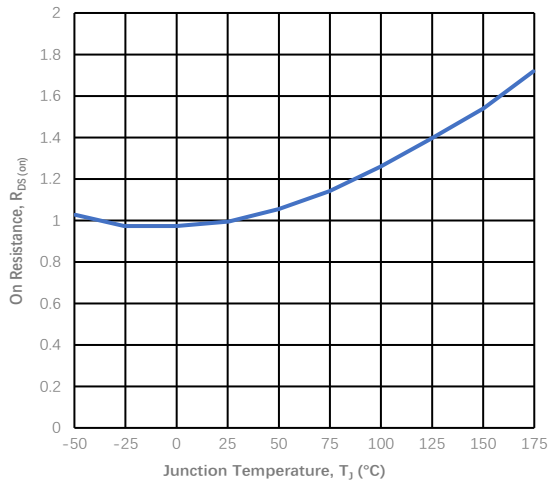


Figure 3

Normalized On-Resistance vs. Temperature

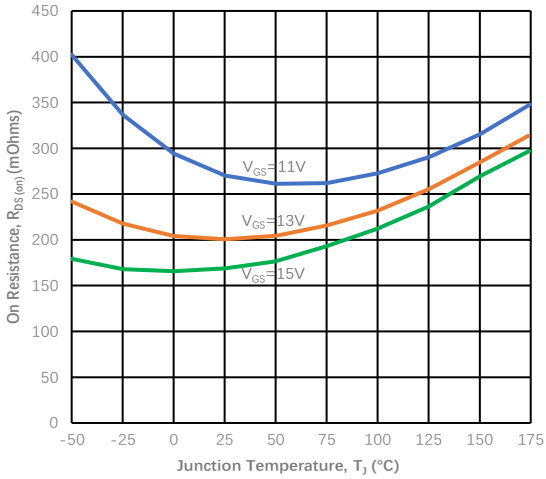


Figure 4

On-Resistance vs. Temperature

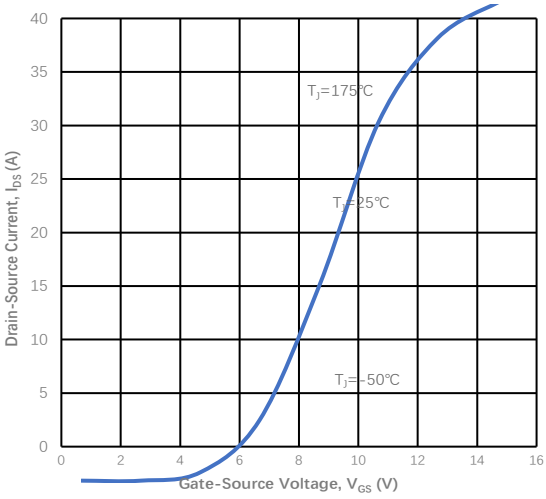


Figure 5

Transfer Characteristic

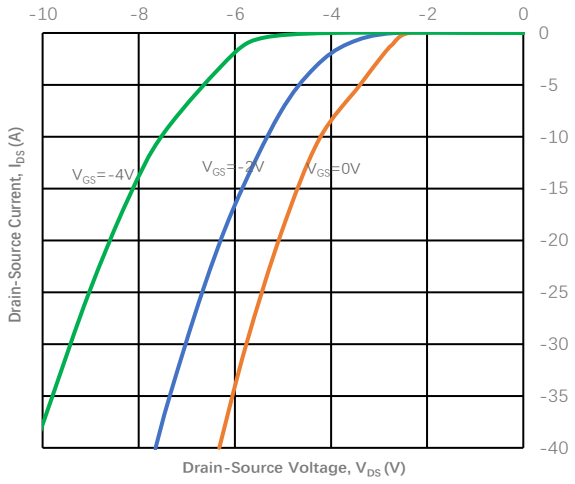


Figure 6

Body Diode Characteristic at 25°C

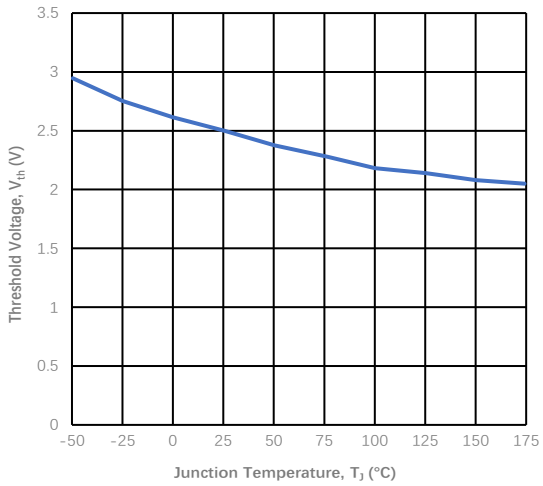


Figure 7

Threshold Voltage vs. Temperature

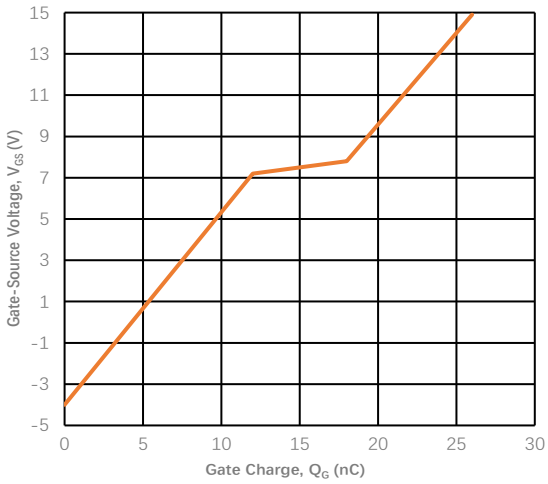


Figure 8

Gate Charge Characteristics

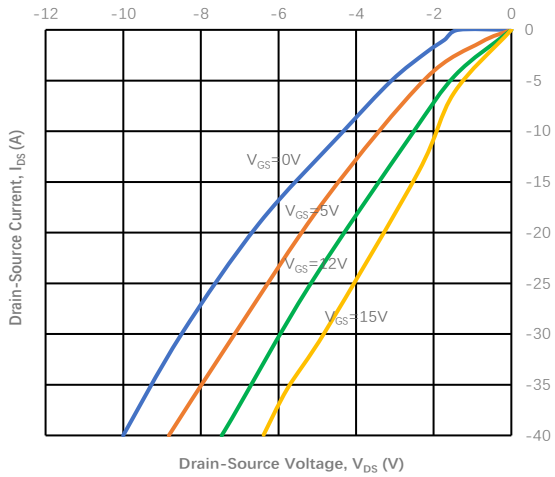


Figure 9

3rd Quadrant Characteristic at 25°C

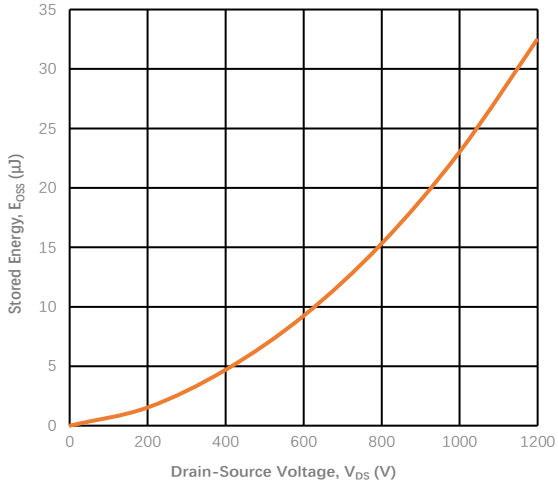


Figure 10

Output Capacitor Stored Energy

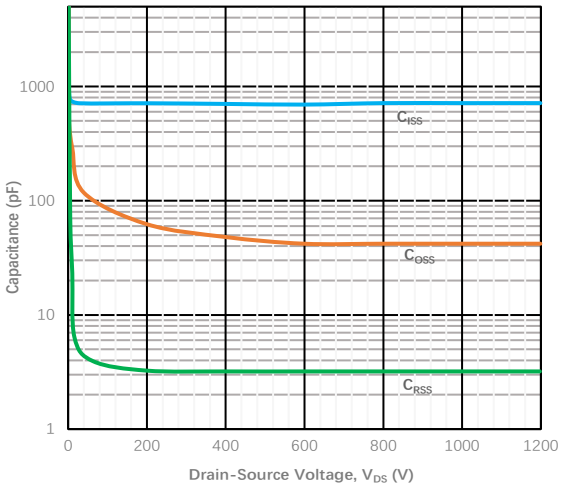


Figure 11

Capacitances vs. Drain-Source

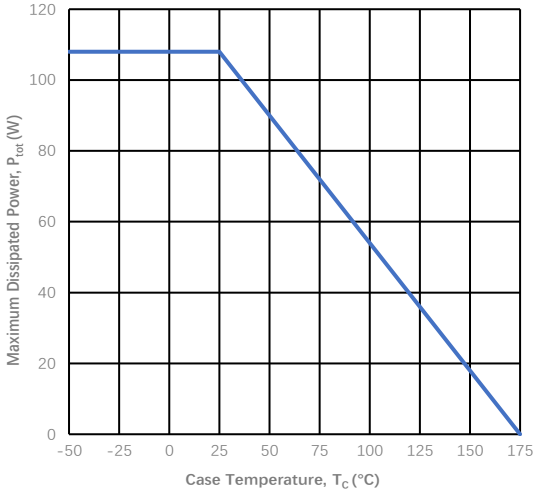


Figure 12

Max Power Dissipation Derating vs T_C

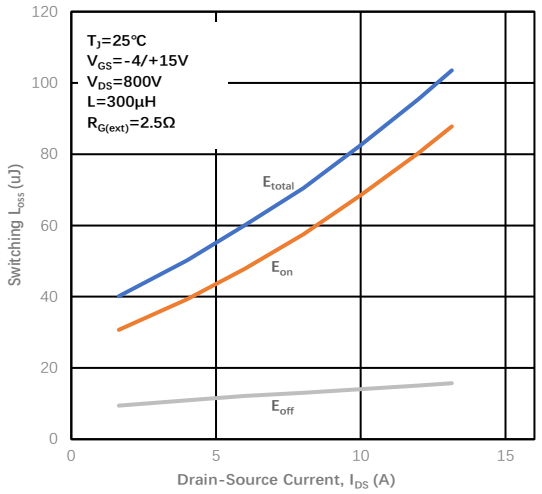


Figure 13

Switching Energy vs. Drain Current

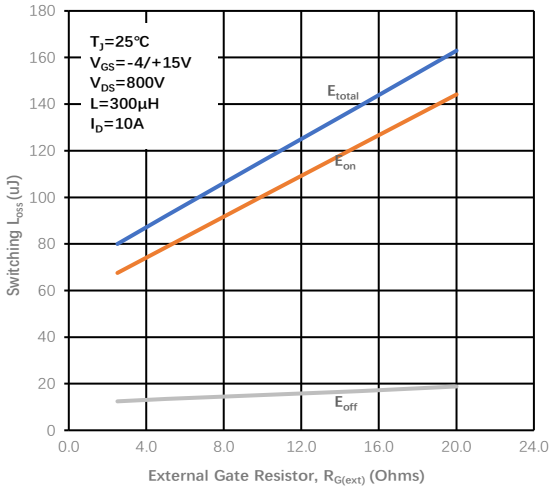


Figure 14

Switching Energy vs. $R_{G(ext)}$

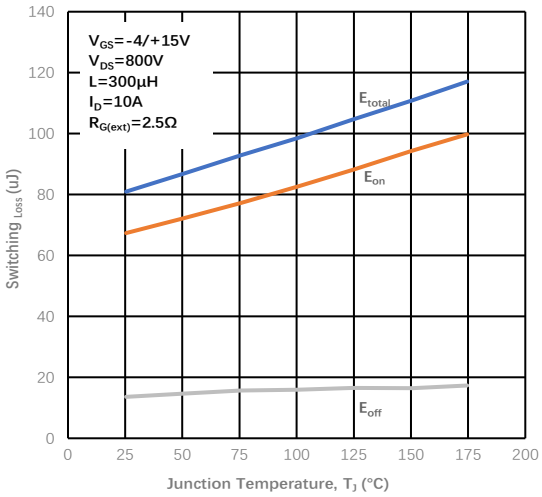


Figure 15

Switching Energy vs. Temperature

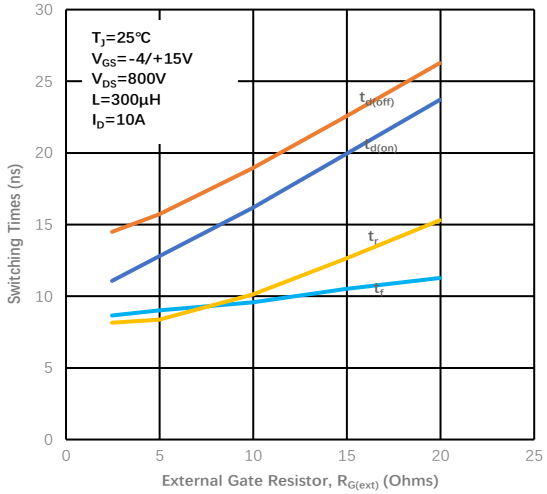


Figure 16

Switching Times vs. $R_{G(ext)}$

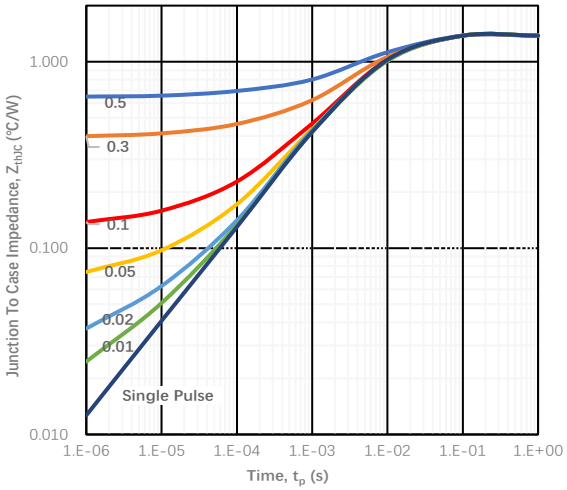


Figure 17

Transient Thermal Impedance

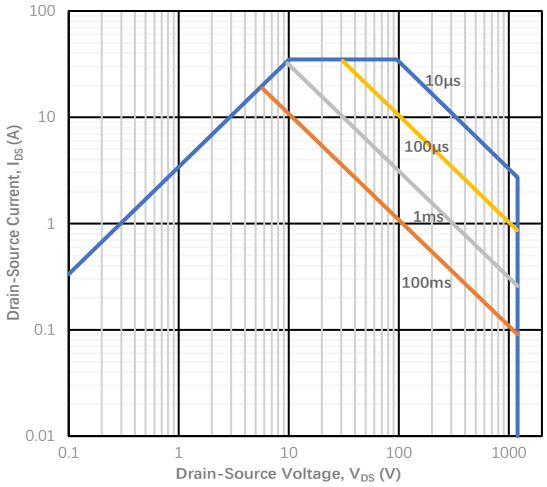
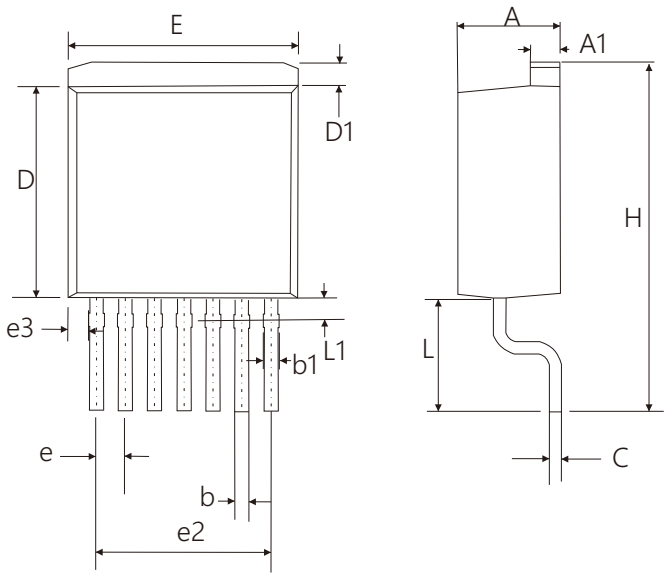


Figure 18

Safe Operating Area

Dimensions

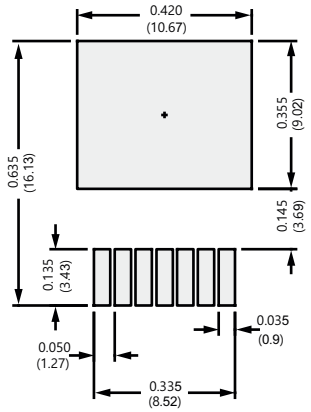
TO-263-7L PACKAGE OUTLINE DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.25	4.75	0.167	0.187
A1	1.2	1.4	0.047	0.055
b	0.5	0.7	0.020	0.028
b1	0.5	0.9	0.020	0.035
C	0.4	0.6	0.016	0.024
D	9.05	9.45	0.356	0.372
D1	0.7	1.3	0.028	0.051
E	9.8	10.2	0.386	0.402
e	1.07	1.47	0.042	0.058
e2	7.32	7.92	0.288	0.312
e3	0.64	1.04	0.025	0.041
H	14.65	15.65	0.577	0.616
L	4.47	5.47	0.176	0.215
L1	0.90	1.50	0.035	0.059

Suggested Pad Layout

(TO-263-7L)



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