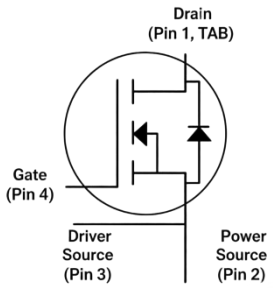
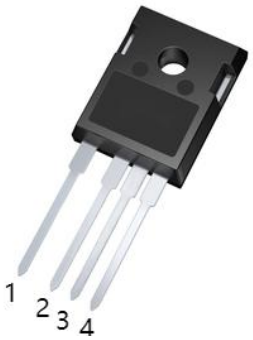
Silicon Carbide Power MOSFET

Parameter	Value	Unit
V_{DS}	650	V
I_D	120	A
$R_{DS(on)}$	20	mΩ
Q_G	125	nC





TO-247-4L

Features

- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Low impedance package with driver source pin
- Easy to parallel and simple to drive

Applications

- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Motor Drives
- Pulsed Power Applications

Absolute Maximum Ratings (at TC=25℃ unless otherwise specified)

Parameter	Symbol	Test Condition	Value	Unit
Drain to Source Voltage	V_{DS}	V_{GS}=0V, I_D=100μA	650	V
Gate to Source Voltage	V_{GS}	Absolute maximum values	-10/+22	V
Recommended Operation Voltage of Gate to Source	V_{GSop}	Recommended operational values	0/+18	V
Continuous Drain Current	I_D	V_{GS}=18V, T_C=25℃	120	A
		V_{GS}=18V, T_C=100℃	100	
Pulsed Drain Current	I_{DM}	V_{GS}=18V, T_C=25℃	240	A
Power Dissipation	P_{tot}	T_C=25℃, T_j =175℃	233	W
Operating and Storage Temperature	T_j , T_{stg}		-55 to +175	℃

Thermal Characteristics

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Thermal Resistance from Junction to Case	Rth(j-c)	-	0.45	-	℃/W

Electrical Characteristics

Static Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=500μA	650			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=23mA,	2.7		4.5	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS}=0V, V_{DS}=650V,T_j=25℃			10	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS}=18V, V_{DS}=0V			250	nA
Drain to Source on Resistance	$R_{DS(on)}$	V_{GS}=18V, I_D=60A		20	26	mΩ
		V_{GS}=18V, I_D=60A, T_j =175℃		23		

Dynamic Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS} =500V, f=100MHz, T_j =25℃		3200		pF
Output Capacitance	C_{oss}			230		
Reverse Transfer Capacitance	C_{rss}			20		
Total Gate Charge	Q_g	V_{GS}=0/18V, V_{DS}=500V, I_D=60A, T_j =25℃		125		nC
Gate-Source Charge	Q_{gs}			35		
Gate-Drain Charge	Q_{gd}			17		
Gate Resistance	R_g	V_{AC}=25mV, f=1MHz		1.3		Ω

Switching Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Turn-On Delay Time	$t_{d(on)}$	V_{GS}=0/18V, V_{DD}=500V, I_D=20A, R_g=10Ω		21		ns
Rise Time	t_r			76		
Turn-Off Delay Time	$t_{d(off)}$			70		
Fall Time	t_f			37		

Reverse Diode Characteristics

Parameter	Symbol	Test Condition	Value			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_{SD}=30A, T_j =25℃	-	3.4		V
Continuous Diode Forward Current	I_S	V_{GS}=0V, T_j =25℃		120		A
Reverse Recovery Time	t_{rr}	V_{GS}=0V, I_{SD}=60A, V_R=500V, di/dt=400A/us, T_j =25℃		35		ns
Reverse Recovery Charge	Q_{rr}			13		nC
Peak Reverse Recovery Current	I_{rrm}			6		A

Typical Characteristics

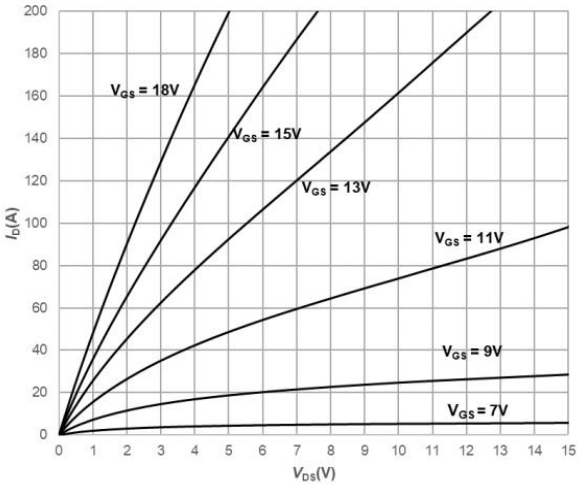


Fig 1. Output Characteristics Tj =25℃

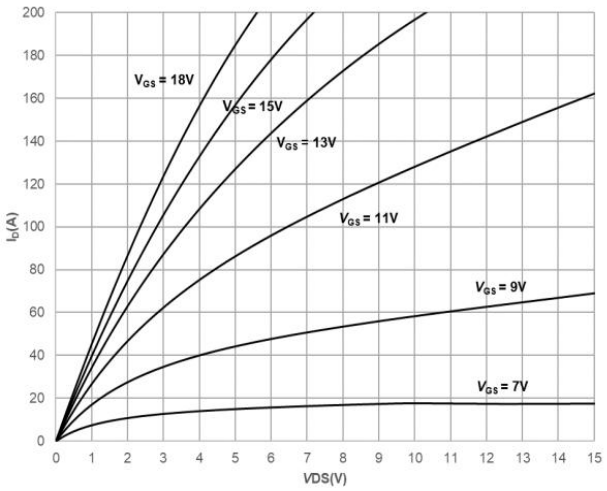


Fig 2. Output Characteristics Tj=175℃

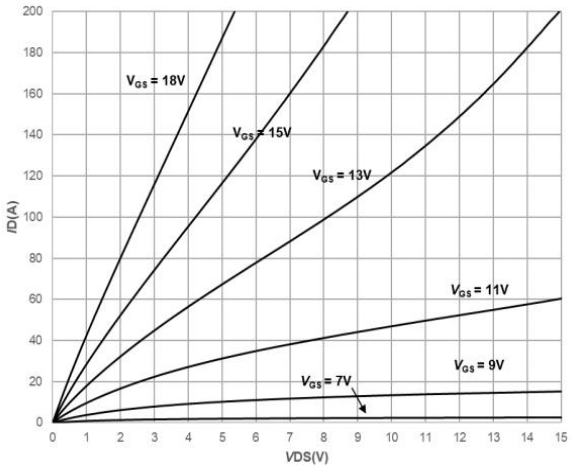


Fig 3. Output Characteristics Tj=-40℃

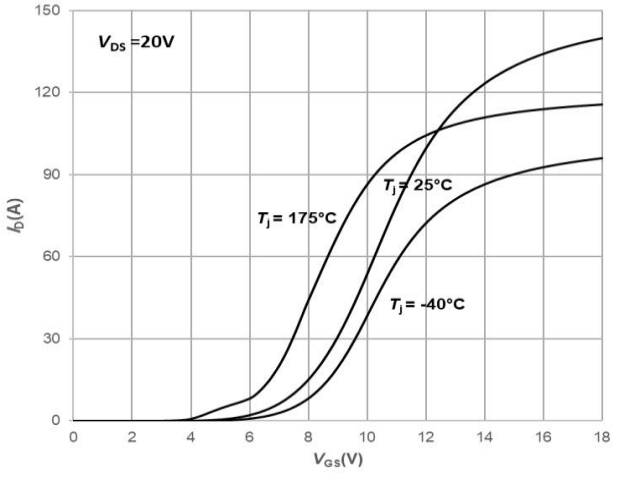


Fig 4. Typical Transfer Characteristics VDS=20V

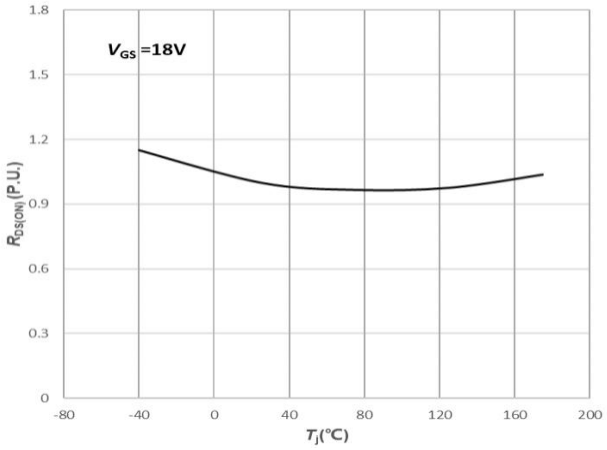


Fig 5.Normalized On-Resistance vs. Temperature

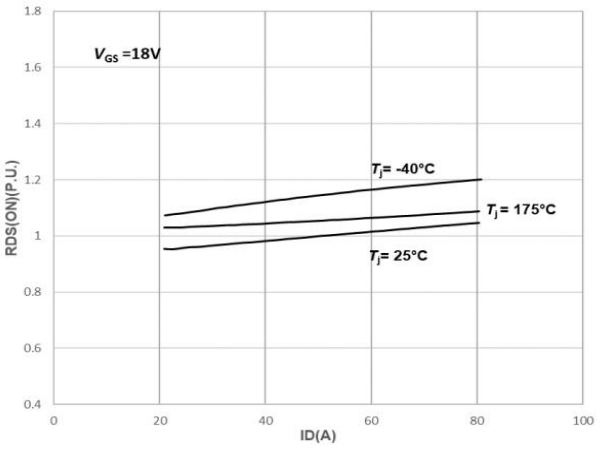


Fig 6.Normalized On-Resistance vs. Drain Current For Various Temperatures

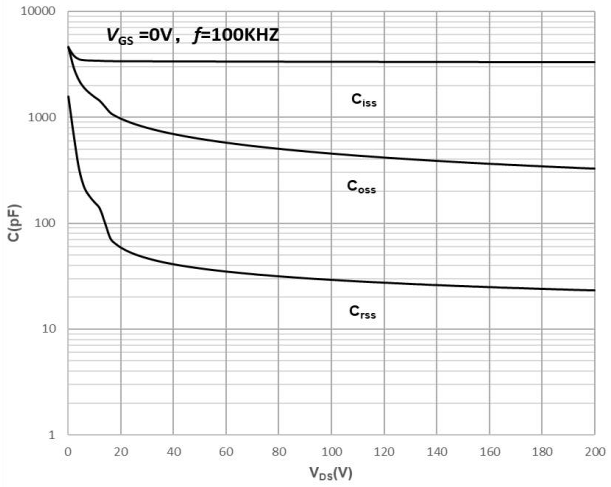


Fig 7. Capacitances vs. Drain-Source Voltage (0-200V)

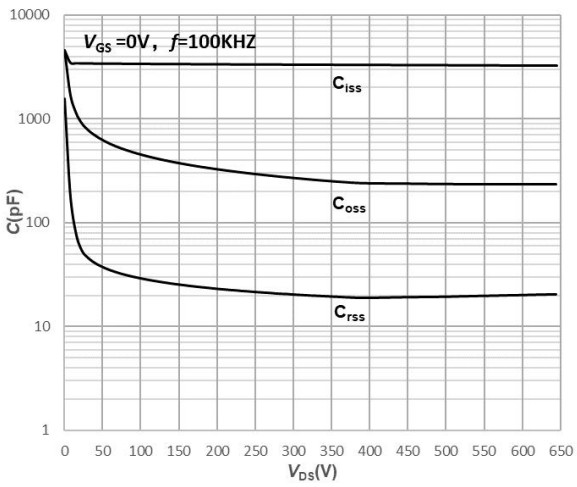


Fig 8. Capacitances vs. Drain-Source Voltage (0-650V)

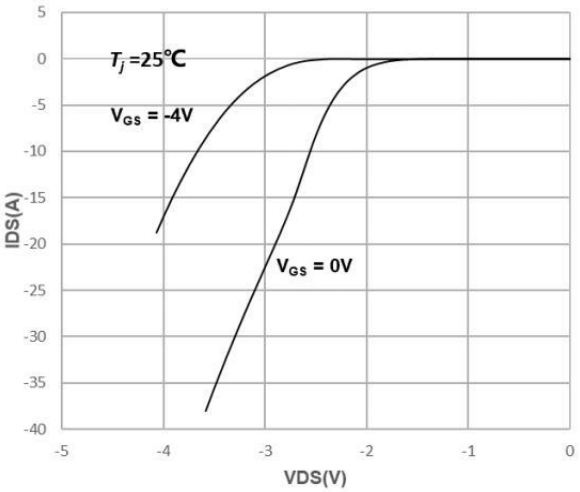


Fig 9. Body Diode Characteristics

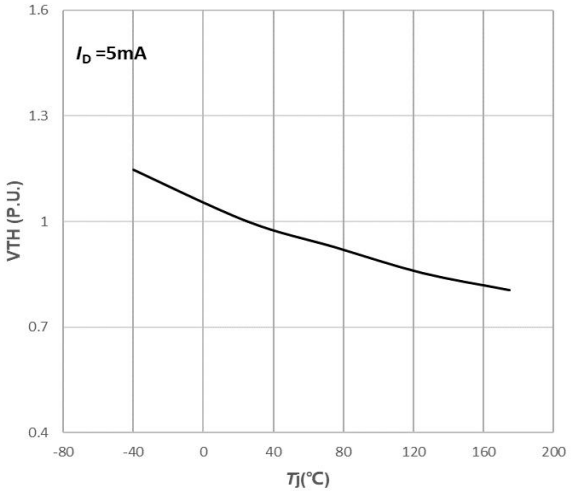
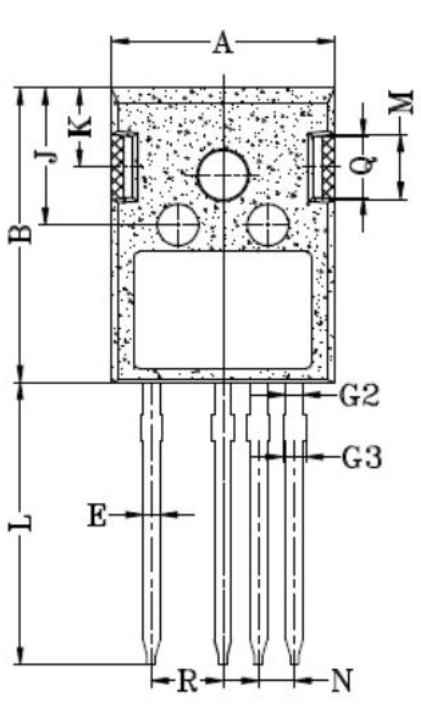
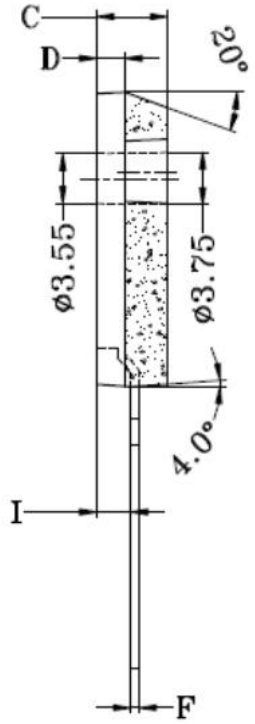


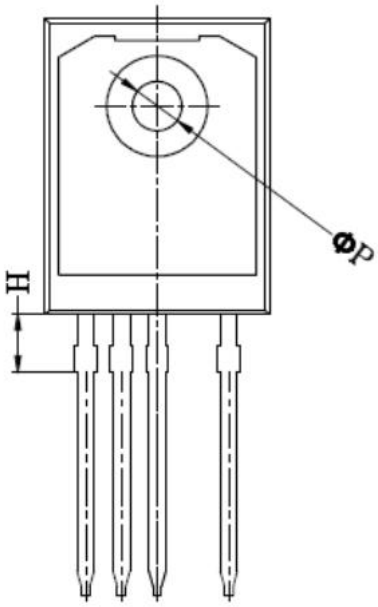
Fig 10. Normalized Threshold Voltage vs. Temperature

Package Outlines (Unit：mm)

TO-247-4L







Symbol	Dimensions in Millimeter	
	MIN	MAX
A	15.80	16.00
B	20.90	21.10
C	4.90	5.10
D	1.90	2.10
E	1.10	1.30
F	0.50	0.70
G2	1.10	1.30
G3	1.18	1.38
H	4.18	4.38
I	2.30	2.50
J	9.65	9.85
K	5.54	5.74
L	19.80	20.20
M	4.50	4.70
N	2.34	2.74
ϕ P	3.40	3.60
Q	4.232	4.432
R	4.88	5.28

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