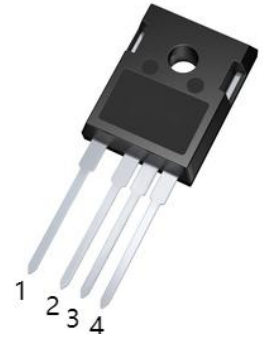
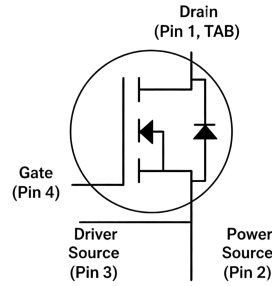


Silicon Carbide Power MOSFET

Parameter	Value	Unit
V_{DS}	1200	V
I_D	20	A
$R_{DS(ON)}$	160	m Ω
Q_G	26	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

- EV Charging
- High Voltage DC/DC Converters
- Switched-Mode Power Supply(SMPS)
- Power Factor Correction(PFC)

Absolute Maximum Ratings (at $T_J=25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DS}	1200	V
Gate-source Voltage	V_{GS}	-8/+19	V
Drain Current (continuous; $T_c=25^{\circ}C$)	I_D	20	A
Drain Current (continuous; $T_c=100^{\circ}C$)		12	
Drain Current (pulsed)	I_{DM}	35	A
Power Dissipation ($T_c=25^{\circ}C$)	P_D	108	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	$^{\circ}C$
Thermal Resistance from Junction to Case	$R_{\theta JC}$	1.29	$^{\circ}C/W$
Thermal Resistance From Junction to Ambient	$R_{\theta JA}$	40	

Electrical Characteristics

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Static characteristics (at $T_C=25^\circ\text{C}$ unless otherwise specified)						
Drain-Source Breakdown Voltage	$B_{V_{DS}}$	$V_{GS}=0V; I_D=250\mu A$	1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=1200V; V_{GS}=0V; T_J=25^\circ\text{C}$	-	-	100	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=-8/+19V; V_{DS}=0V$	-	-	250	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}; I_{DS}=2mA$	1.8	2.5	3.6	V
Recommended Turn-on Voltage	$V_{GS(on)}$	Static	-	15	-	V
Recommended Turn-off Voltage	$V_{GS(off)}$		-	-4	-	V
Static Drain-Source on Resistance	$R_{DS(on)}$	$V_{GS}=15V; I_D=10A; T_J=25^\circ\text{C}$	-	160	208	m Ω
		$V_{GS}=15V; I_D=10A; T_J=175^\circ\text{C}$	-	272	-	
Dynamic characteristics (at $T_C=25^\circ\text{C}$ unless otherwise specified)						
Input Capacitance	C_{iss}	$V_{DS}=1000V; f=1MHz; V_{AC}=25mV$	-	715	-	pF
Output Capacitance	C_{oss}		-	42	-	
Reverse Transfer Capacitance	C_{rss}		-	3.2	-	
Transconductance	g_{fs}	$V_{DS}=20V; I_D=10A$	-	6	-	S
C_{OSS} Stored Energy	E_{OSS}	$V_{DS}=1000V; f=1MHz$	-	23	-	μJ
Turn-on Energy	E_{on}	$V_{DS}=800V; V_{GS}=-4/+15V; I_D=10A;$ $Load=300\mu H; T_J=175^\circ\text{C}$	-	105	-	μJ
Turn-off Energy	E_{off}		-	18	-	
Total Gate Charge	Q_G	$V_{DS}=800V; V_{GS}=-4/+15V; I_D=10A$	-	26	-	nC
Gate-Source Charge	Q_{GS}		-	12	-	
Gate-Drain Charge	Q_{GD}		-	6	-	
Internal Gate Resistor	R_{Gint}	$f=1MHz; V_{AC}=25mV$	-	5	-	Ω
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=800V; V_{GS}=-4/+15V; I_D=10A;$ $R_{g(ext)}=2.5\Omega; Load=300\mu H$	-	12	-	ns
Rise Time	t_r		-	9	-	
Turn-off Delay Time	$t_{d(off)}$		-	15	-	
Fall Time	t_f		-	9	-	

Reverse SiC Diode Characteristics(at $T_J=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{FSD}	$V_{GS}=0V; I_F=5A; T_J=25^\circ\text{C}$	-	3.5	6	V
		$V_{GS}=0V; I_F=5A; T_J=175^\circ\text{C}$	-	3	6	
Continuous Diode Forward Current	I_S	$V_{GS}=0V; T_C=25^\circ\text{C}$	-	20	-	A
Reverse Recovery Time	t_{RR}	$V_R=800V; V_{GS}=-4V; I_F=10A;$ $di/dt=1900A/\mu s; T_J=175^\circ\text{C}$	-	7	-	ns
Reverse Recovery Charge	Q_{RR}		-	33	-	nC
Peak Reverse Recovery Current	I_{RRM}		-	9	-	A

Typical Characteristics

Fig1. Output characteristics ($T_J = 25^\circ\text{C}$)

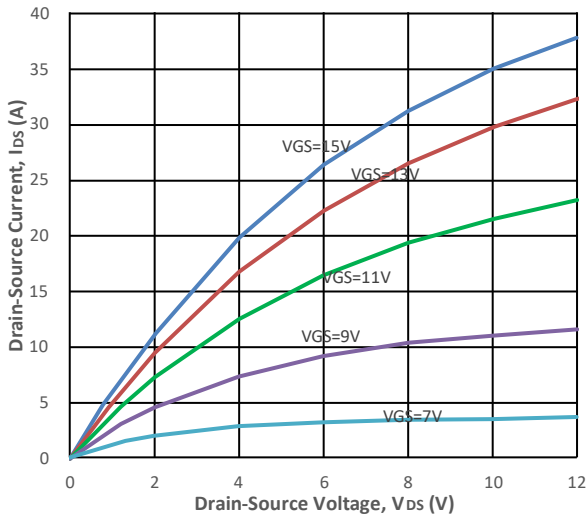


Fig2. Output characteristics ($T_J = 175^\circ\text{C}$)

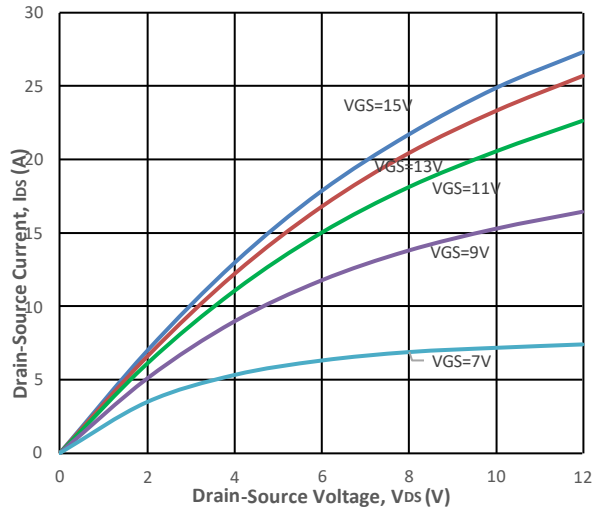


Fig3. Normalized On-Resistance vs. Temperature

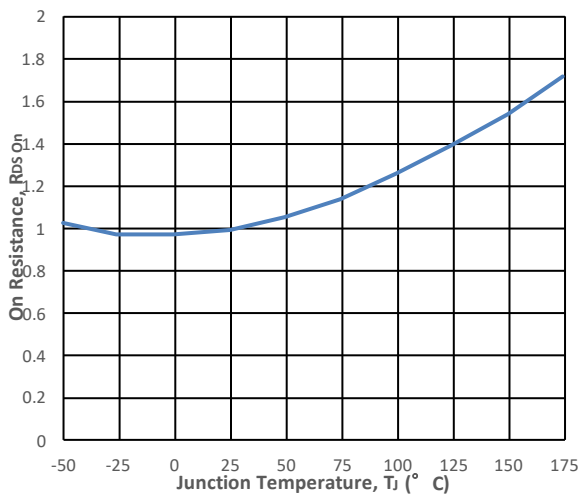


Fig4. On-Resistance vs. Temperature

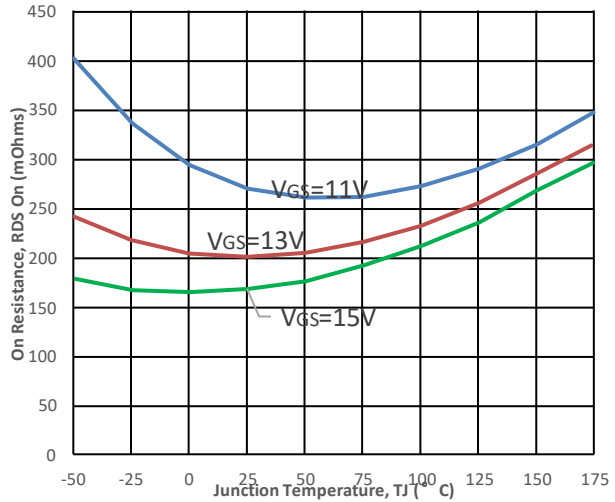


Fig5. Transfer Characteristic

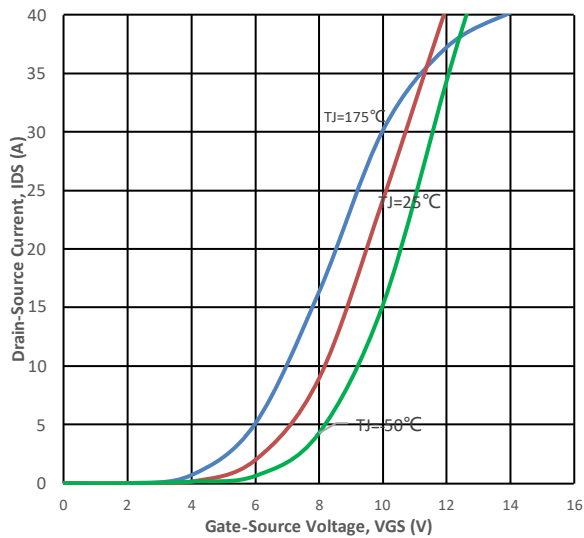


Fig6. Body Diode Characteristic at 25°C

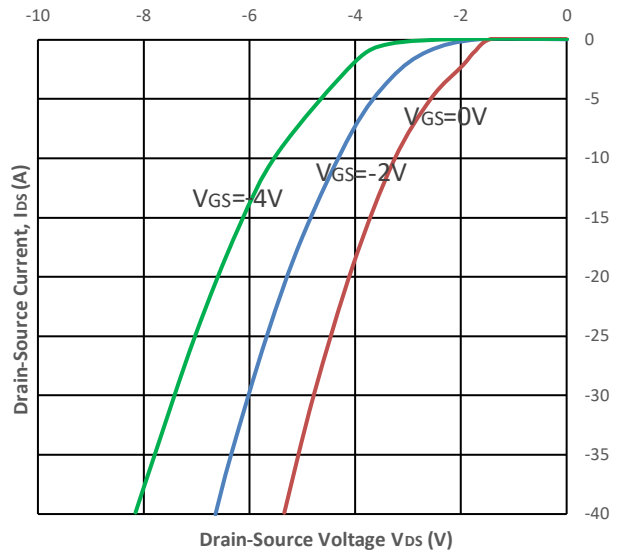


Fig7. Threshold Voltage vs. Temperature

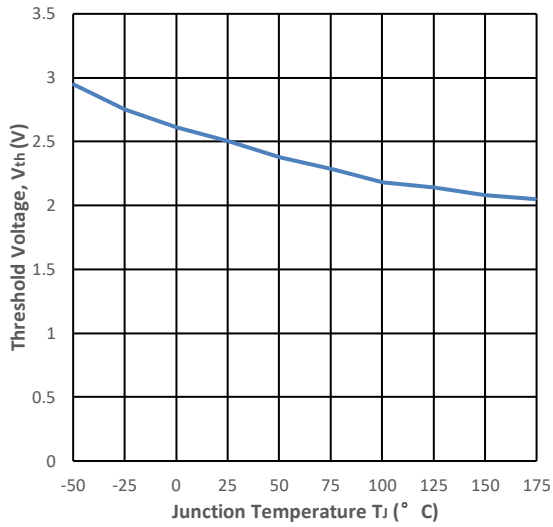


Fig8. Gate Charge Characteristics

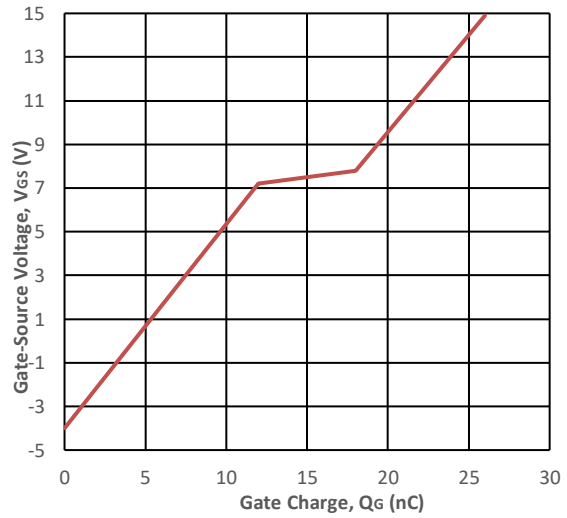


Fig9. 3rd Quadrant Characteristic at 25 $^{\circ}$ C

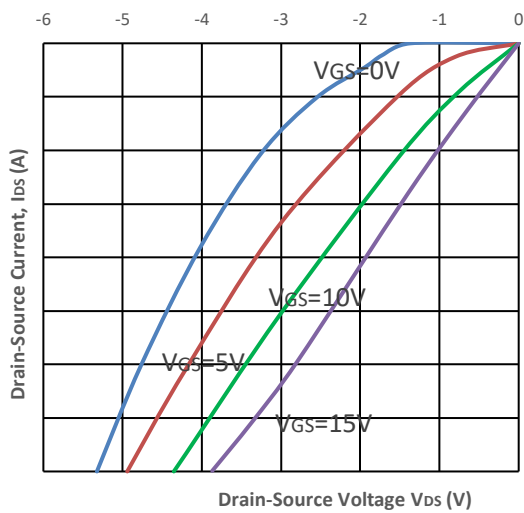


Fig10. Output Capacitor Stored Energy

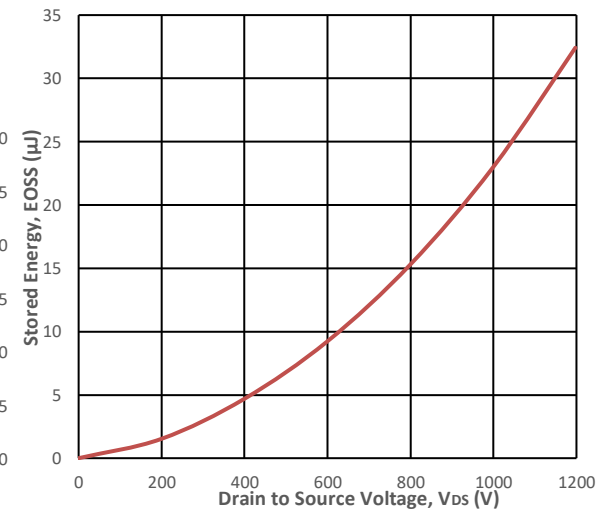


Fig11. Capacitances vs. Drain-Source

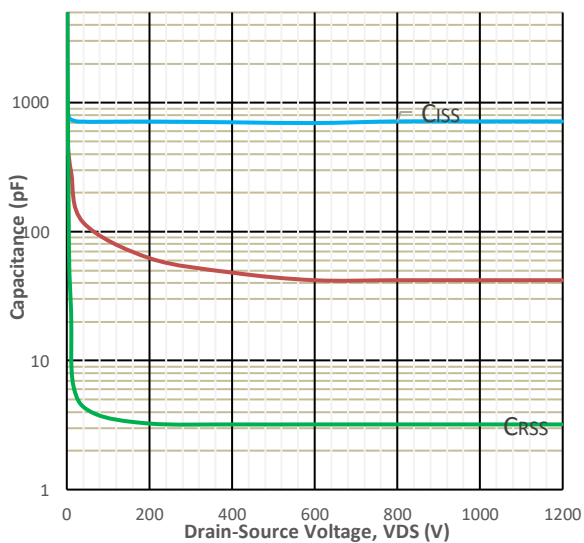


Fig12. Max Power Dissipation Derating V_{sd}

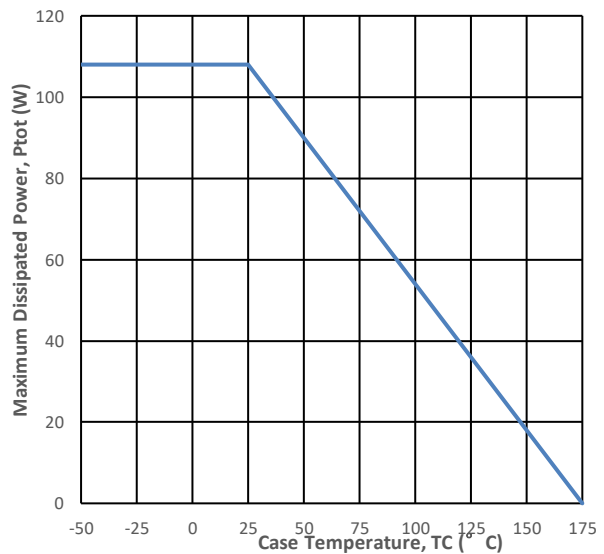


Fig13. Switching Energy vs. Drain Current

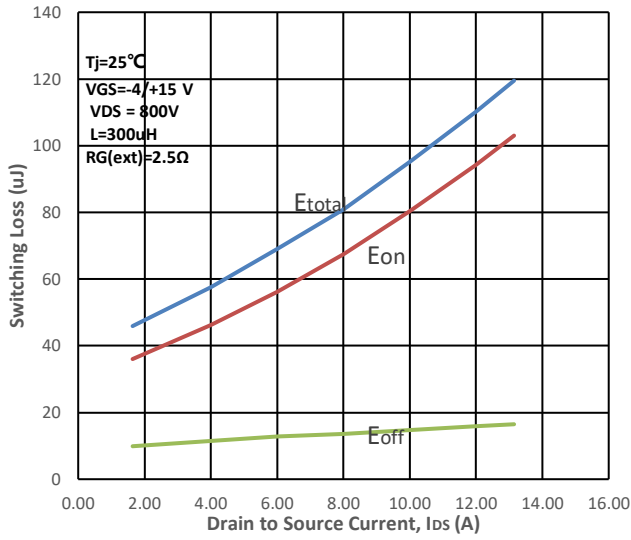


Fig14. Switching Energy vs. RG(ext)

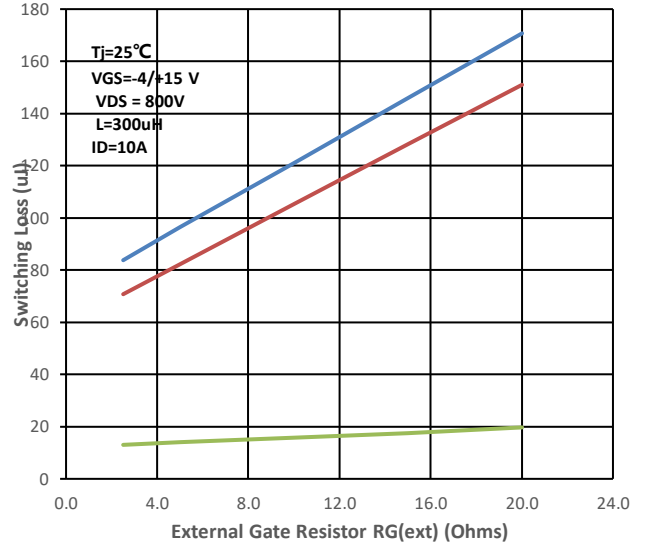


Fig15. Switching Energy vs. Temperature

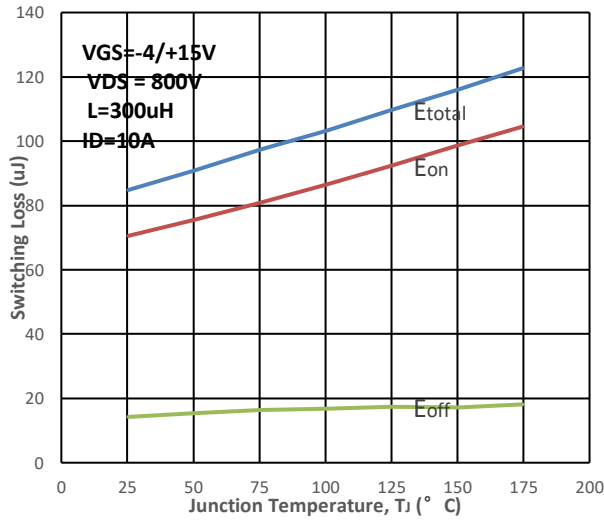


Fig16. Switching Times vs. RG(ext)

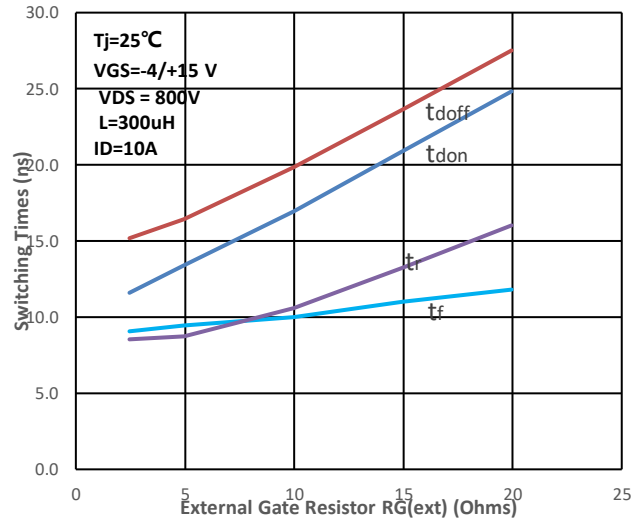


Fig17. Transient Thermal Impedance

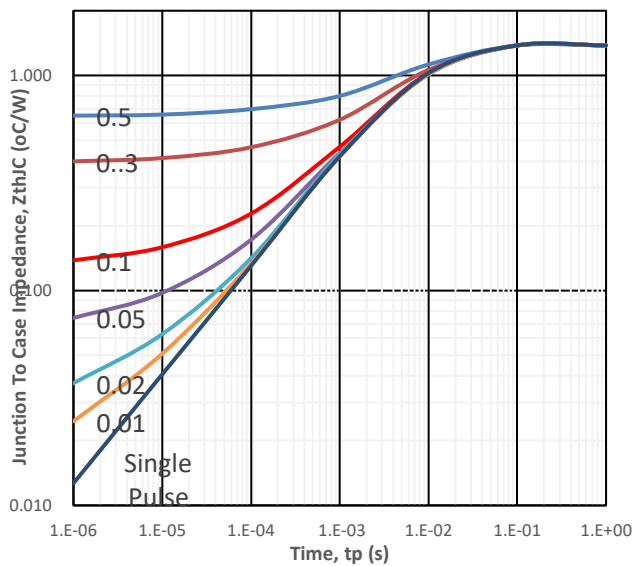
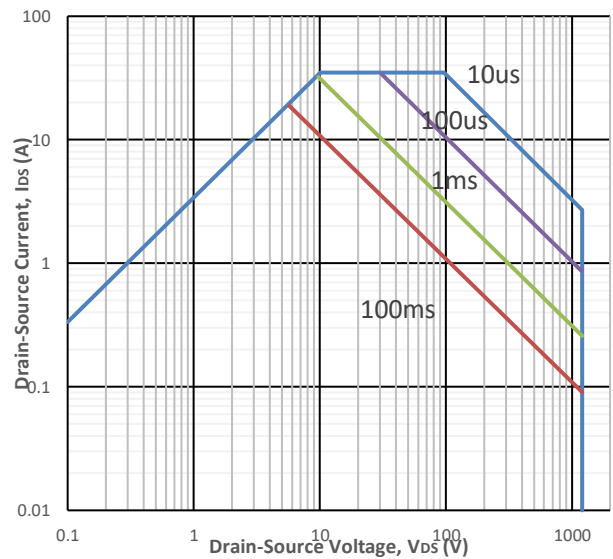
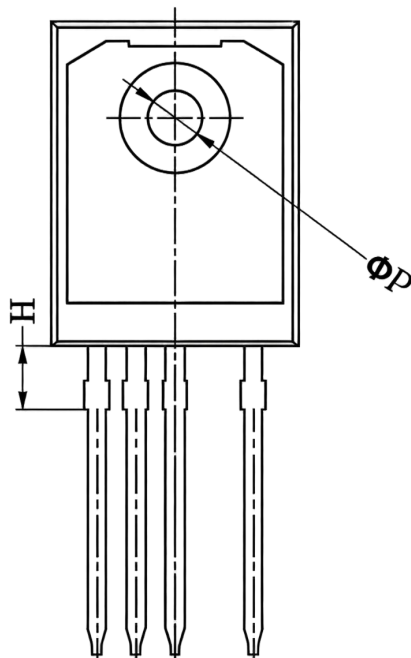
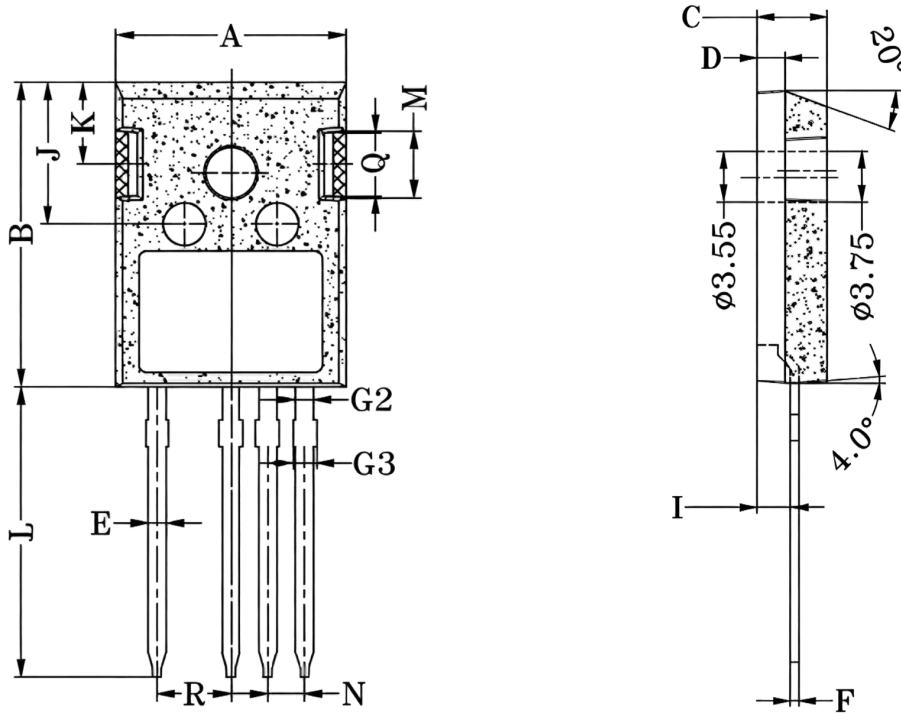


Fig18. Safe Operating Area



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
ϕP	3.40	3.60
Q	4.232	4.432
R	4.88	5.28

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