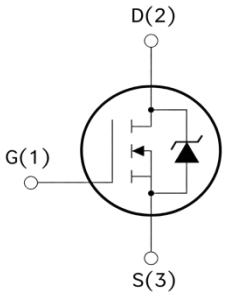
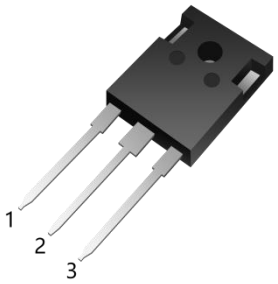
Silicon Carbide Power MOSFET

Parameter	Value	Unit
V_{DS}	1700	V
I_D	40	A
$R_{DS(ON)}$	72	mΩ
Q_G	100	nC





TO-247-3L

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℃ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-source Voltage	V_{DS}	1700	V
Gate-source Voltage	V_{GS}	-10/+22	V
Drain Current (continuous;Tc=25°C)	I_D	40	A
Drain Current (continuous;Tc=100°C)		28	
Drain Current (pulsed)	I_{DM}	118	A
Power Dissipation (Tc=25°C)	P_D	242	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	°C
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.62	°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°C unless otherwise specified)						
Drain-Source Breakdown Voltage	B_{VDS}	V_{GS}=0V; I_D=250uA	1700	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1700V; V_{GS}=0V	-	5	100	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=-10/+20V; V_{DS}=0V	-	10	150	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}; I_{DS}=10mA	2	3	4	V
Recommended Turn-on Voltage	$V_{GS(on)}$	Static	-	18	-	V
Recommended Turn-off Voltage	$V_{GS(off)}$		-	-5	-	V
Static Drain-Source on Resistance	$R_{DS(on)}$	V_{GS}=18V; I_D=20A	-	72	88	mΩ
		V_{GS}=18V; I_D=20A; T_J=175°C	-	130	-	
Dynamic characteristics (at T_C=25°C unless otherwise specified)						
Input Capacitance	C_{iss}	V_{DS}=1000V; f=1MHz; V_{AC}=25mV	-	1550	-	pF
Output Capacitance	C_{oss}		-	138	-	
Reverse Transfer Capacitance	C_{rss}		-	20	-	
Transconductance	g_{fs}	V_{DS}=20V; I_D=18A	-	12	-	S
C_{OSS} Stored Energy	E_{OSS}	V_{DS}=1000V; f=1MHz	-	60	-	uJ
Turn-on Energy	E_{on}	V_{DS}=1000V; V_{GS}=-5/+18V; I_D=25A; $R_{g(ext)}$=4.7Ω; Load=150μH; T_J=175°C	-	950	-	uJ
Turn-off Energy	E_{off}		-	200	-	
Total Gate Charge	Q_G	V_{DS}=1000V; V_{GS}=-5/+18V; I_D=25A	-	100	-	nC
Gate-Source Charge	Q_{GS}		-	45	-	
Gate-Drain Charge	Q_{GD}		-	22	-	
Internal Gate Resistor	R_{Gint}	f=1MHz; V_{AC}=25mV	-	3	-	Ω
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=1000V; V_{GS}=-5/+18V; I_D=25A; $R_{g(ext)}$=4.7Ω; Load=150μH	-	35	-	ns
Rise Time	t_r		-	22	-	
Turn-off Delay Time	$t_{d(off)}$		-	19	-	
Fall Time	t_f		-	15	-	

Reverse SiC Diode Characteristics(at T_J=25℃ unless otherwise specified)

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Diode Forward Voltage	V_{FSD}	V_{GS}=0V; I_F=20A	-	3.8	6	V
		V_{GS}=0V; I_F=20A; T_J=175°C	-	3.5	6	
Continuous Diode Forward Current	I_S	V_{GS}=0V; T_C=25°C	-	30.5	-	A
Reverse Recovery Time	t_{RR}	V_R=1000V; V_{GS}=-5V; I_F=20A; di/dt=1000A/μs; T_J=175°C	-	36	-	ns
Reverse Recovery Charge	Q_{RR}		-	160	-	nC
Peak Reverse Recovery Current	I_{RRM}		-	10.5	-	A

Typical Characteristics

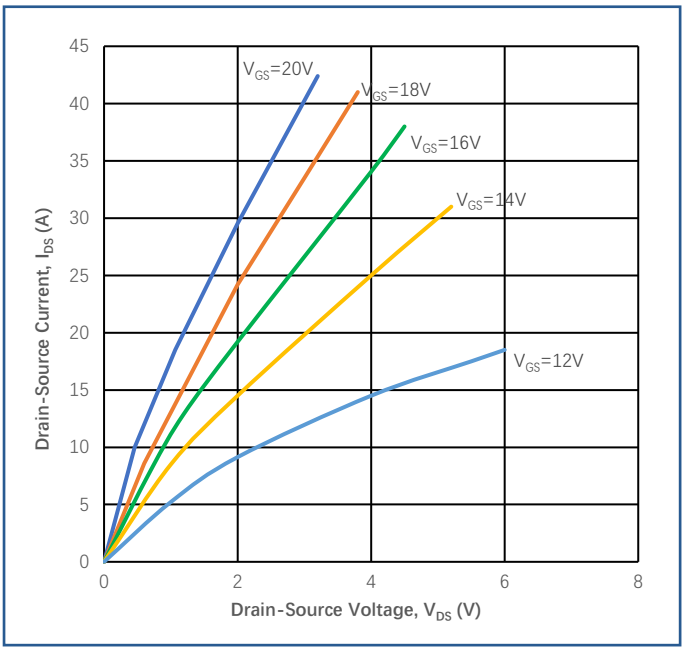


Fig 1

Output Characteristics (T_J=25 °C)

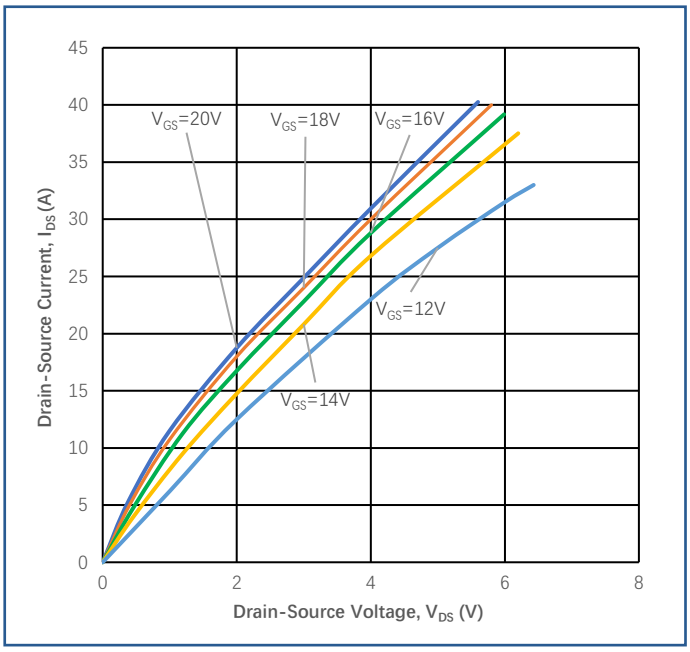


Fig 2

Output Characteristics (T_J=175°C)

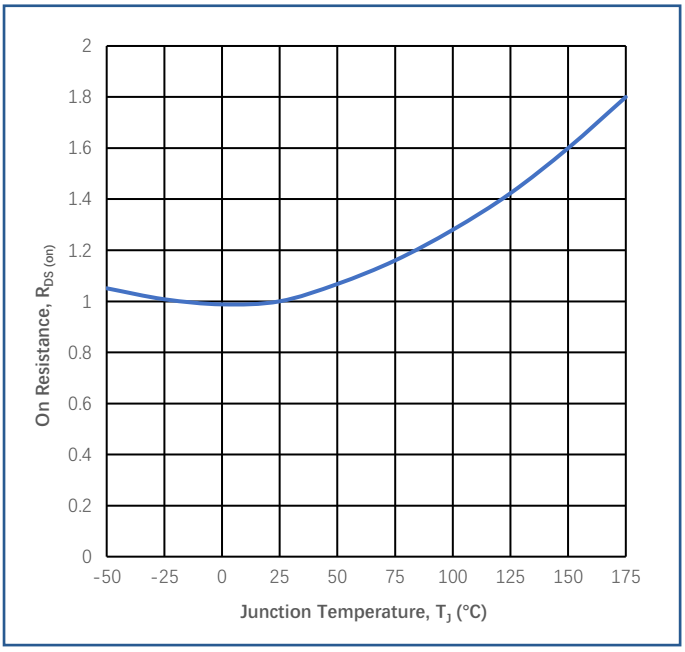


Fig 3

Normalized On-Resistance vs. Temperature

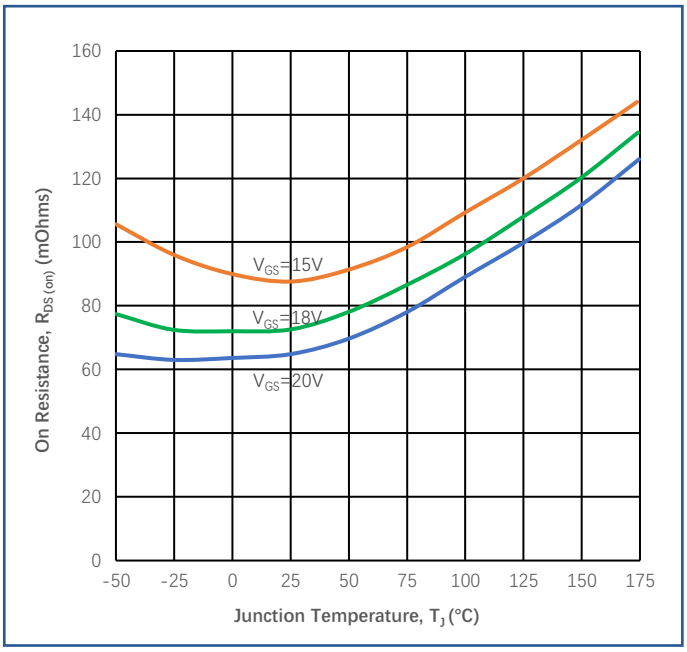


Fig 4

On-Resistance vs. Temperature

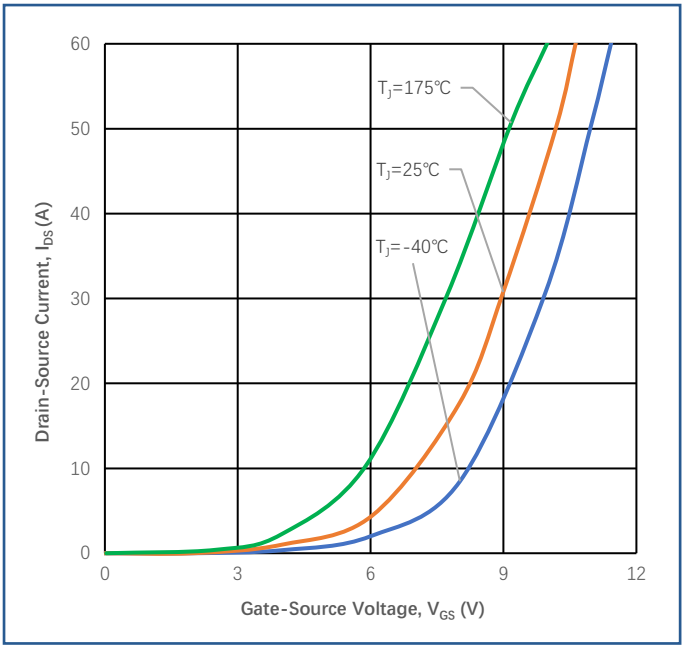


Fig 5

Transfer Characteristic

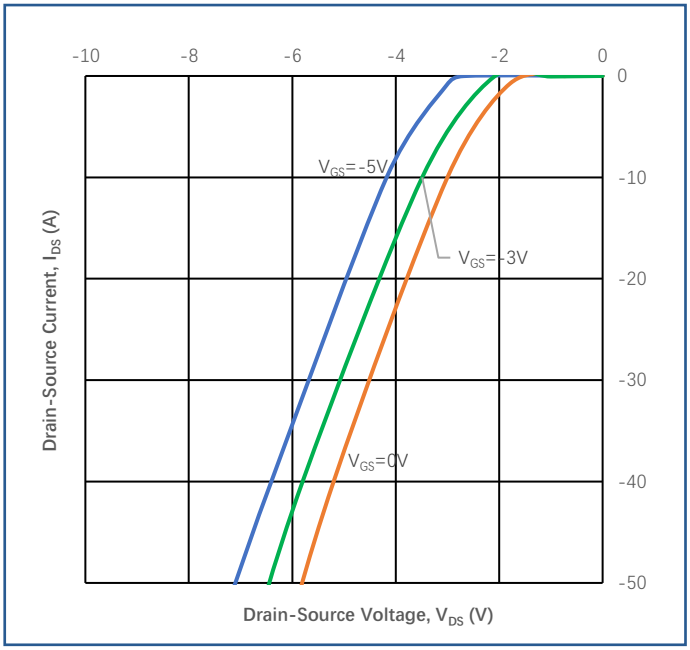


Fig 6

Body Diode Characteristic at 25°C

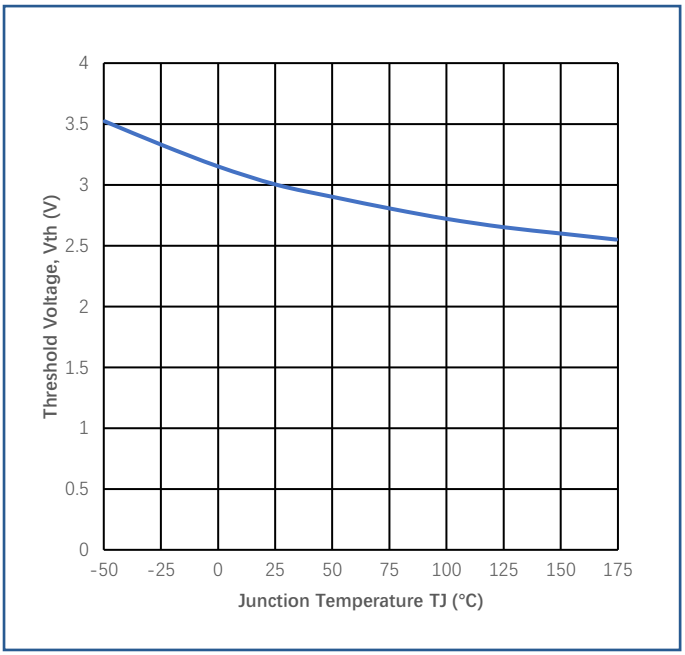


Fig 7

Threshold Voltage vs. Temperature

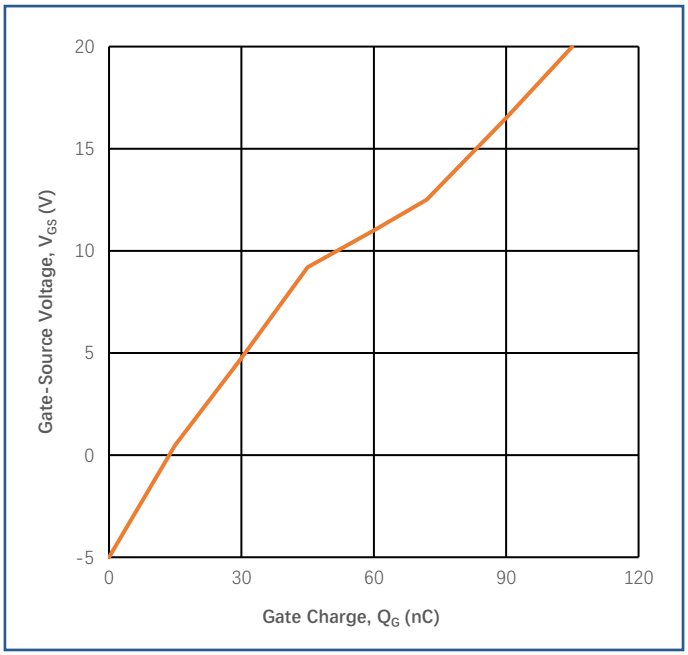


Fig 8

Gate Charge Characteristics

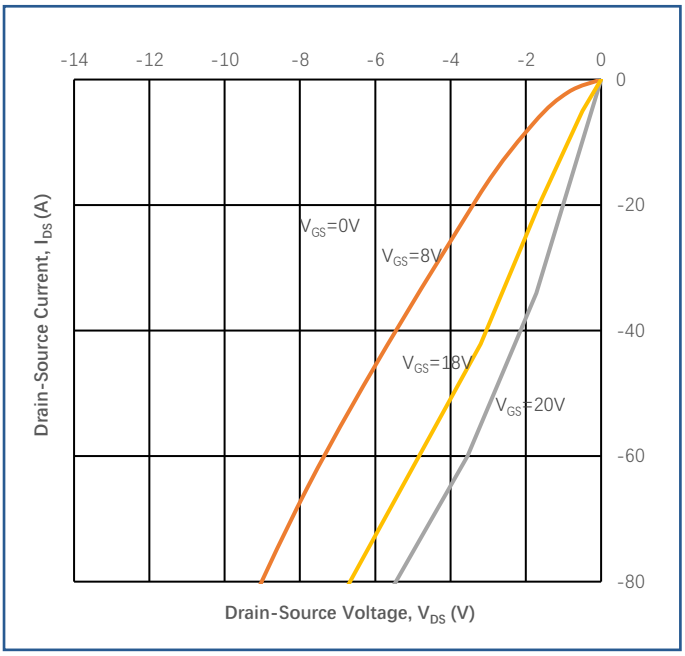


Fig 9

3rd Quadrant Characteristic at 25°C

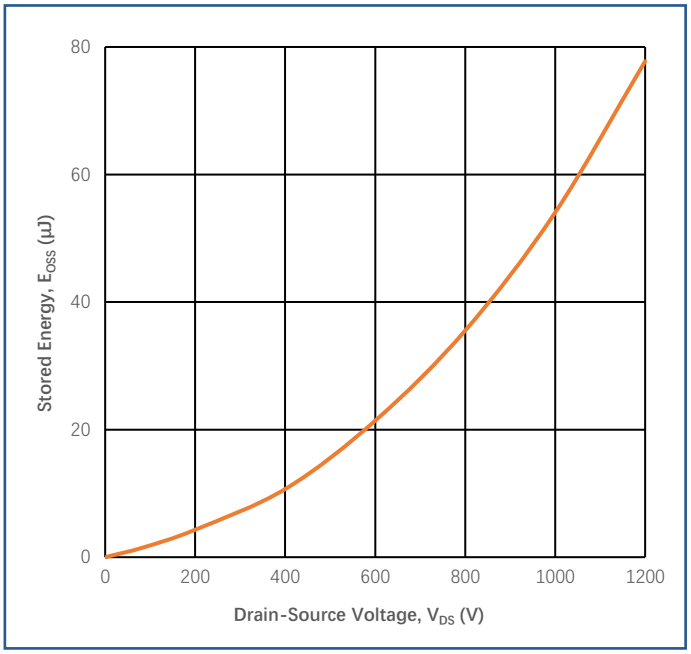


Fig 10

Output Capacitor Stored Energy

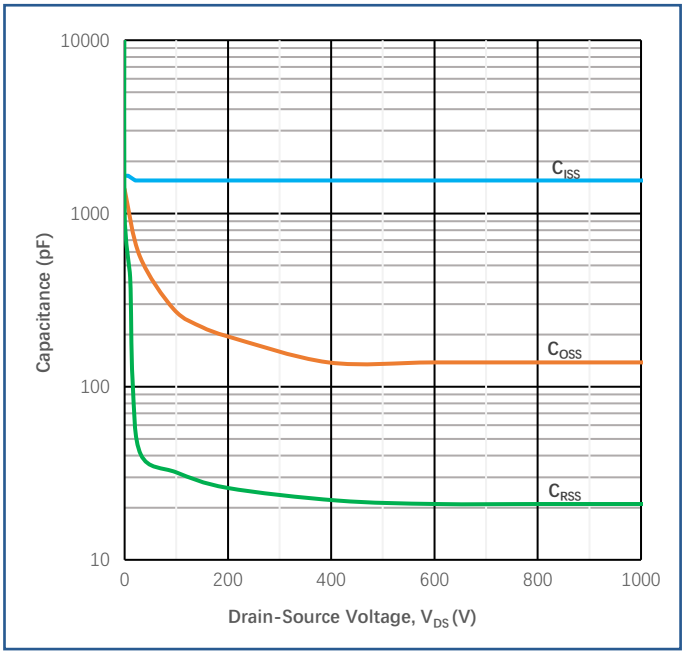


Fig 11

Capacitances vs. Drain-Source

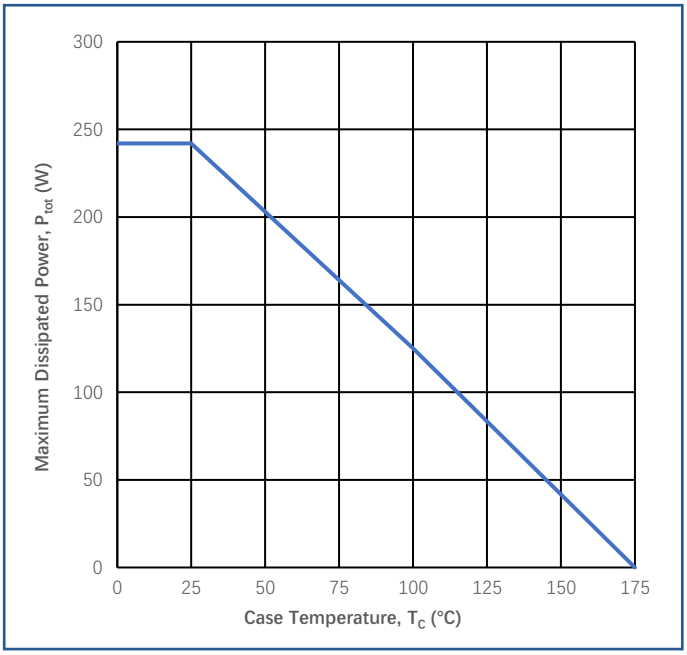


Fig 12

Max Power Dissipation Derating vs T_C

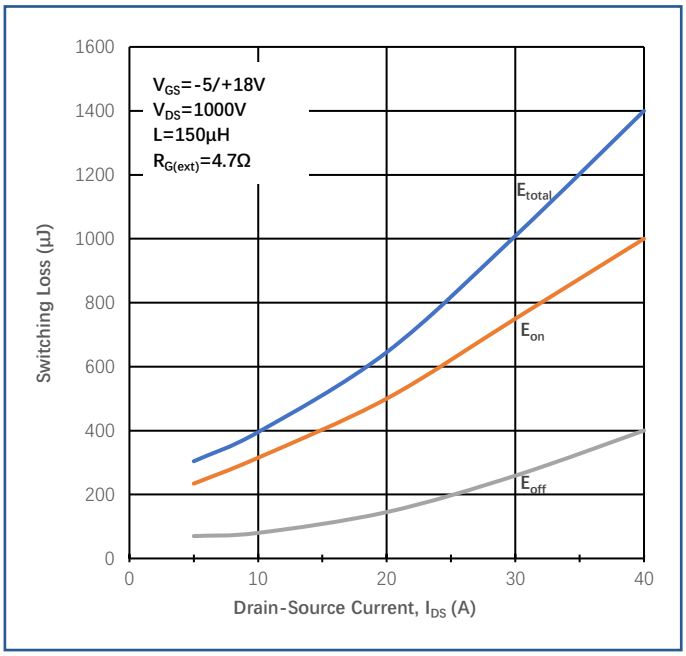


Fig 13

Switching Energy vs. Drain Current

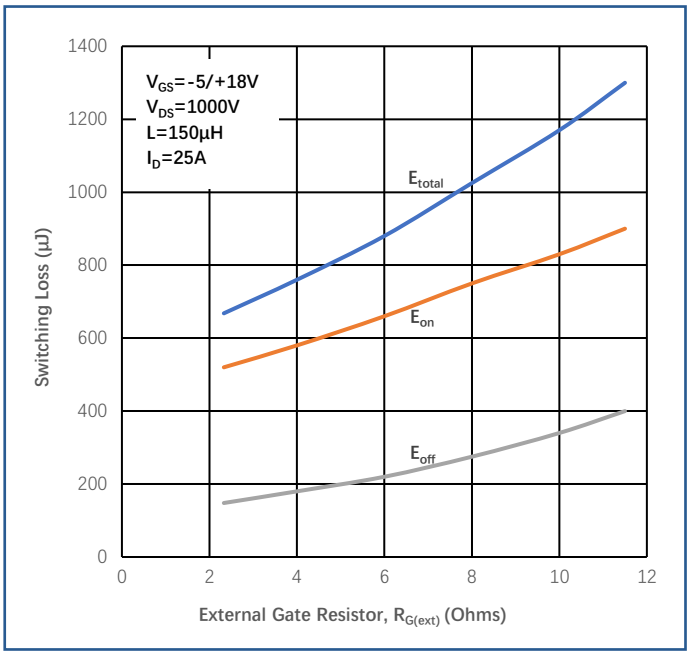


Fig 14

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

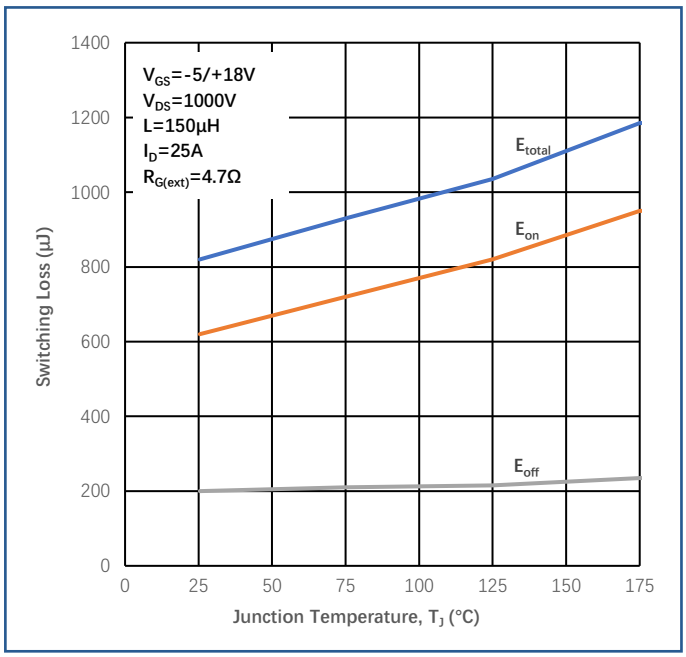


Fig 15

Switching Energy vs. Temperature

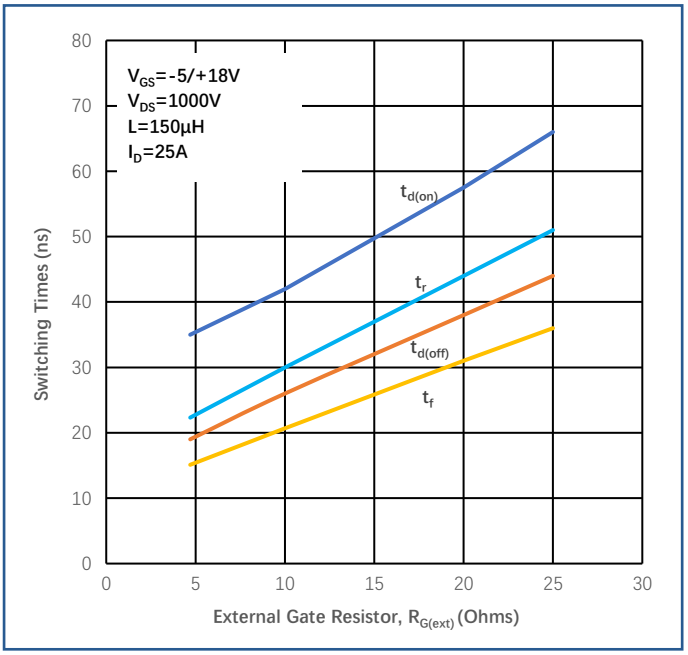


Fig 16

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

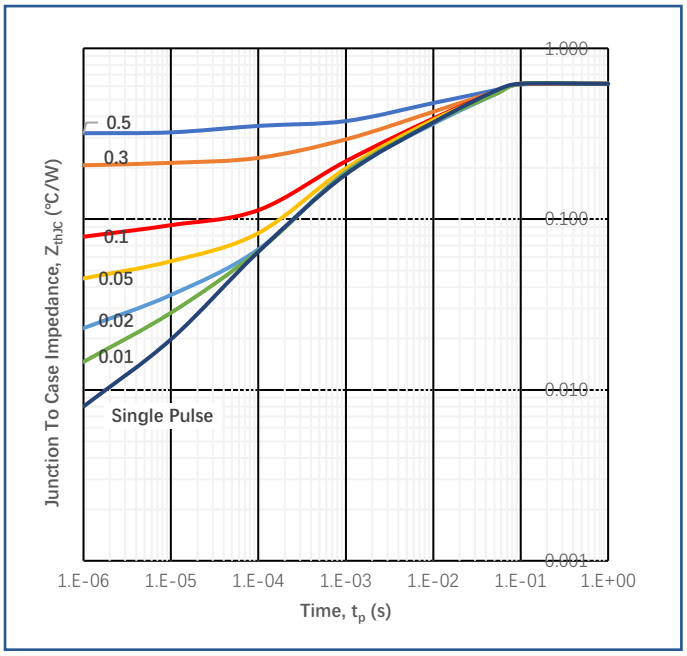


Fig 17

Transient Thermal Impedance

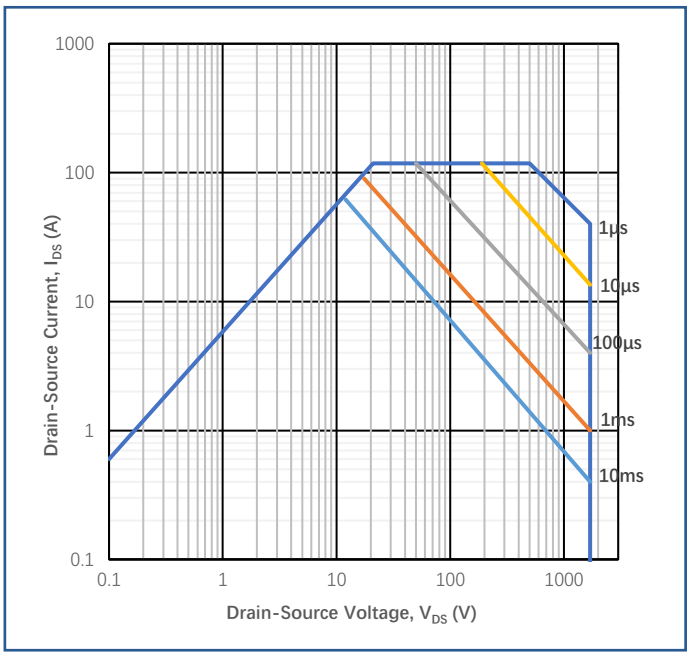
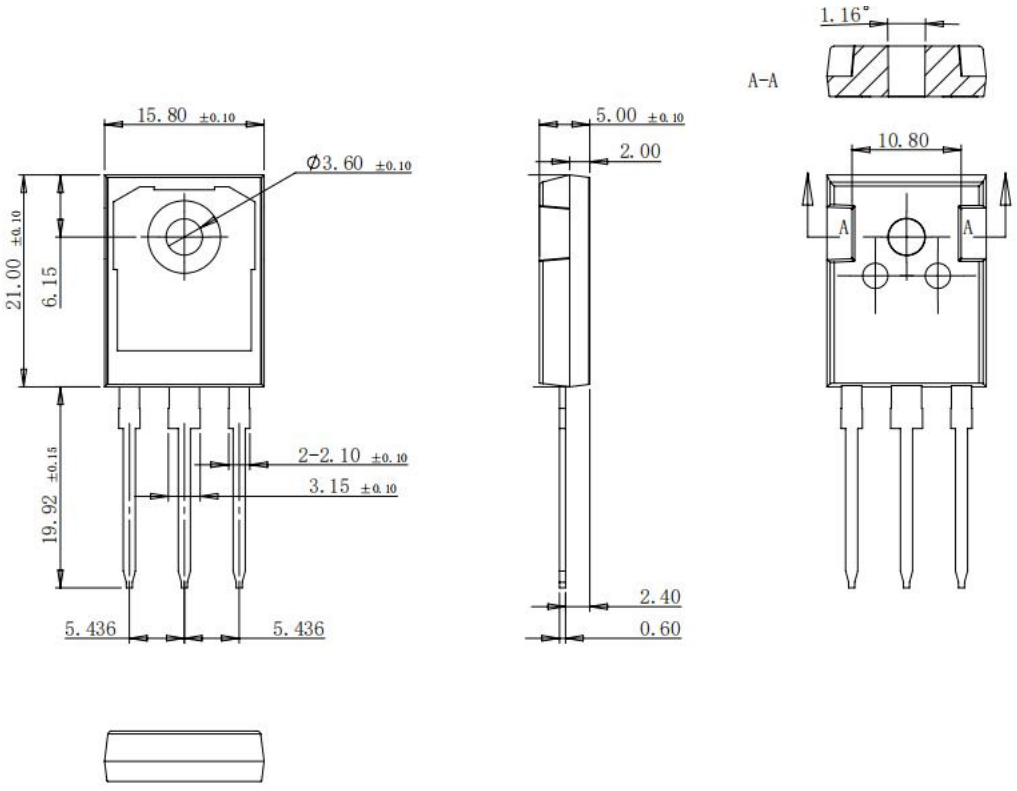


Fig 18

Safe Operating Area

Package Outlines(Unit:mm)

TO-247-3L



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