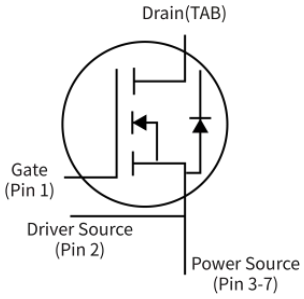
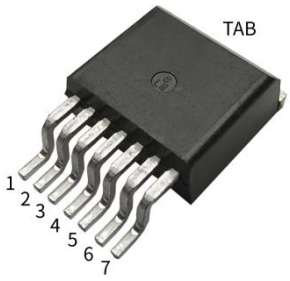
Silicon Carbide Power MOSFET

Parameter	Value	Unit
V_{DS}	1200	V
I_D	32	A
$R_{DS(ON)}$	80	mΩ
Q_G	72	nC





TO-263-7L

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}	1200	V
Gate-source Voltage	V_{GS}	-10/+22	V
Drain Current (continuous;Tc=25°C)	I_D	32	A
Drain Current (continuous;Tc=100°C)		23	
Drain Current (pulsed)	I_{DM}	80	A
Power Dissipation (Tc=25°C)	P_D	167	W
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55 to +175	°C
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.9	°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	1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=1200V; V_{GS}=0V	-	-	100	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=-10/+20V; V_{DS}=0V	-	10	250	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}; I_{DS}=5mA	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; T_J=25°C	-	80	100	mΩ
		V_{GS}=18V; I_D=20A; T_J=175°C	-	144	-	
Dynamic characteristics (at T_C=25°C unless otherwise specified)						
Input Capacitance	C_{iss}	V_{DS}=1000V; f=1MHz; V_{AC}=25mV	-	1455	-	pF
Output Capacitance	C_{oss}		-	78	-	
Reverse Transfer Capacitance	C_{rss}		-	3.5	-	
Transconductance	g_{fs}	V_{DS}=20V; I_D=20A	-	10	-	S
C_{OSS} Stored Energy	E_{OSS}	V_{DS}=1000V; f=1MHz	-	35.7	-	uJ
Turn-on Energy	E_{on}	V_{DS}=800V; V_{GS}=-5/+18V; I_D=20A; $R_{g(ext)}$=2.5Ω; Load=150μH; T_J=175°C	-	460	-	uJ
Turn-off Energy	E_{off}		-	120	-	
Total Gate Charge	Q_G	V_{DS}=800V; V_{GS}=-5/+18V; I_D=15A	-	72	-	nC
Gate-Source Charge	Q_{GS}		-	21	-	
Gate-Drain Charge	Q_{GD}		-	22	-	
Internal Gate Resistor	R_{Gint}	f=1MHz; V_{AC}=25mV	-	5.6	-	Ω
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=800V; V_{GS}=-5/+18V; I_D=20A; $R_{g(ext)}$=2.5Ω; Load=150μH	-	38	-	ns
Rise Time	t_r		-	13	-	
Turn-off Delay Time	$t_{d(off)}$		-	30	-	
Fall Time	t_f		-	10	-	

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=10A; T_J=25°C	-	3.9	6	V
		V_{GS}=0V; I_F=10A; T_J=175°C	-	3.5	6	
Continuous Diode Forward Current	I_S	V_{GS}=0V; T_C=25°C	-	27	-	A
Reverse Recovery Time	t_{RR}	V_R=800V; V_{GS}=-5V; I_F=20A; di/dt=900A/μs; T_J=175°C	-	32	-	ns
Reverse Recovery Charge	Q_{RR}		-	257	-	nC
Peak Reverse Recovery Current	I_{RRM}		-	12	-	A

Typical Characteristics

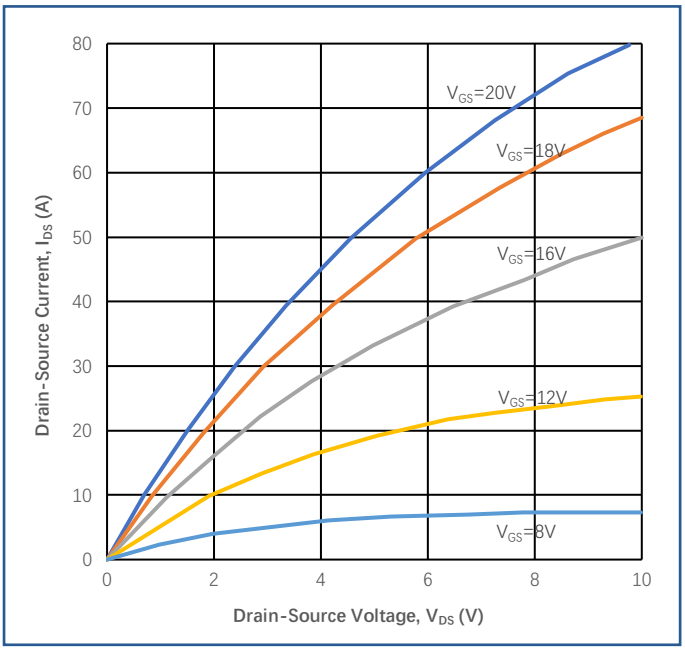


Fig 1
Output Characteristics (T_J=25°C)

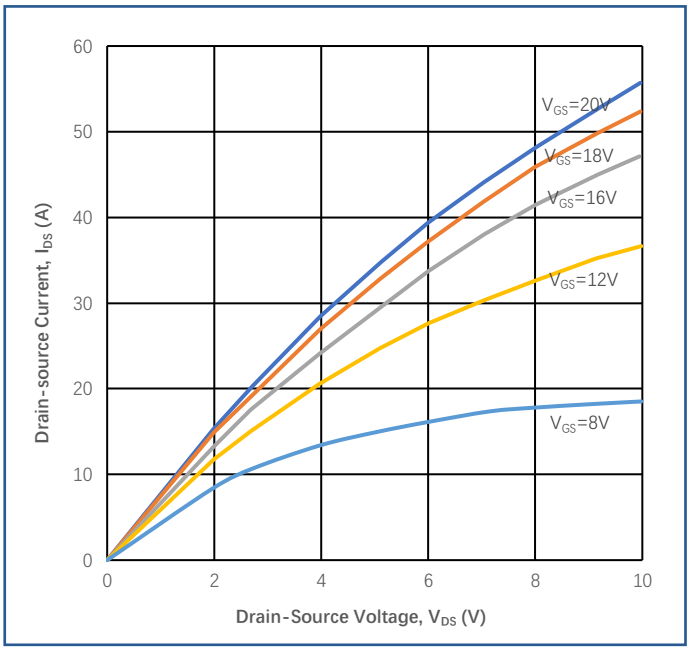


Fig 2
Output Characteristics (T_J=175°C)

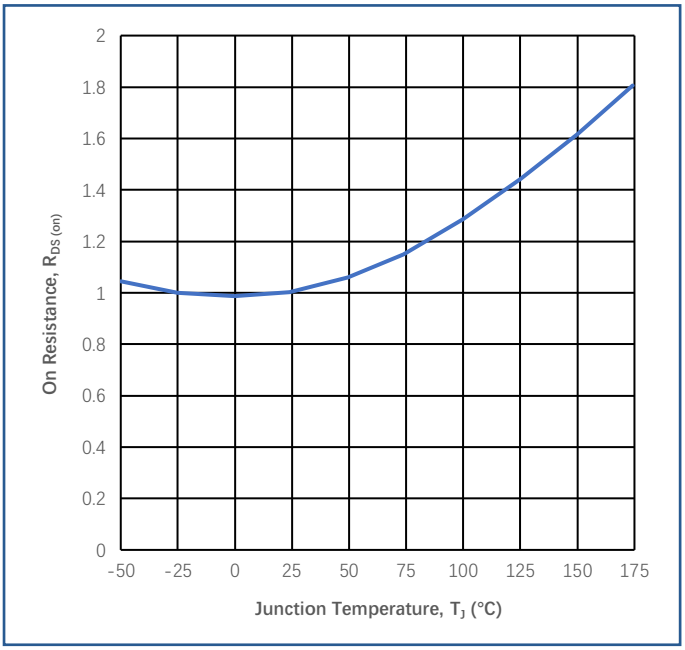


Fig 3
Normalized On-Resistance vs. Temperature

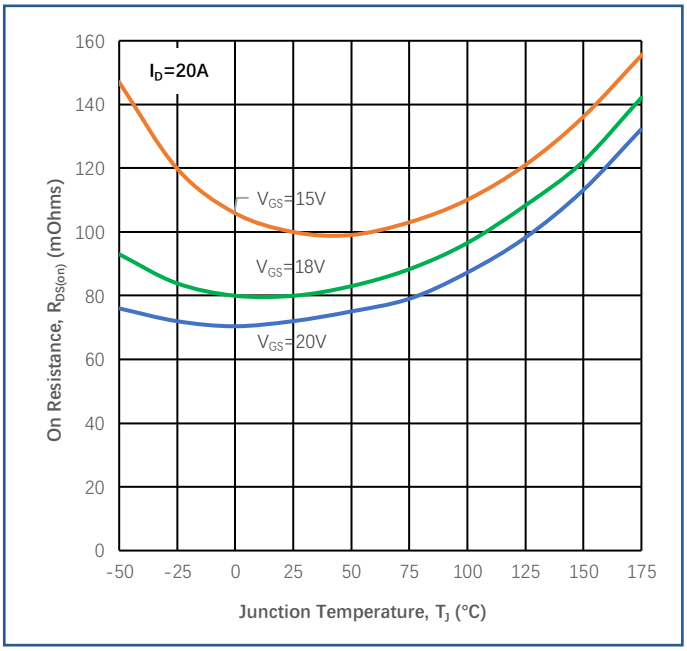


Fig 4
On-Resistance vs. Temperature

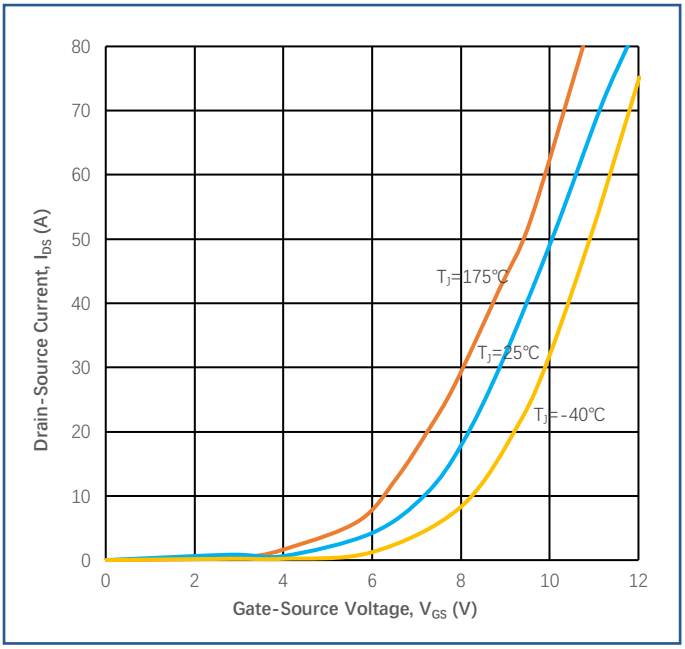


Fig 5
Transfer Characteristic

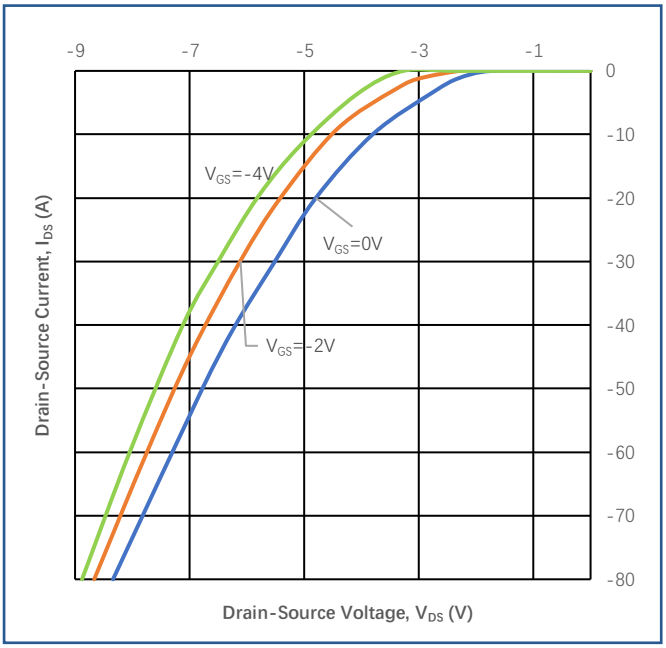


Fig 6
Body Diode Characteristic at 25°C

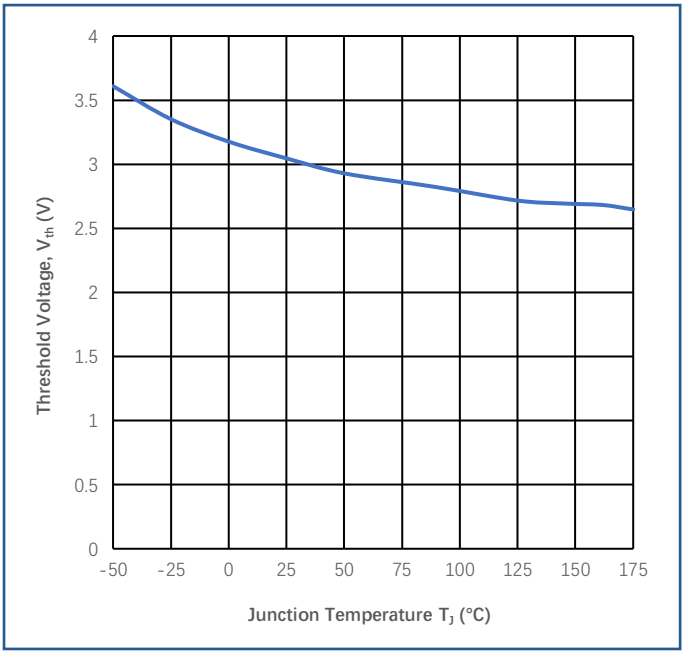


Fig 7
Threshold Voltage vs. Temperature

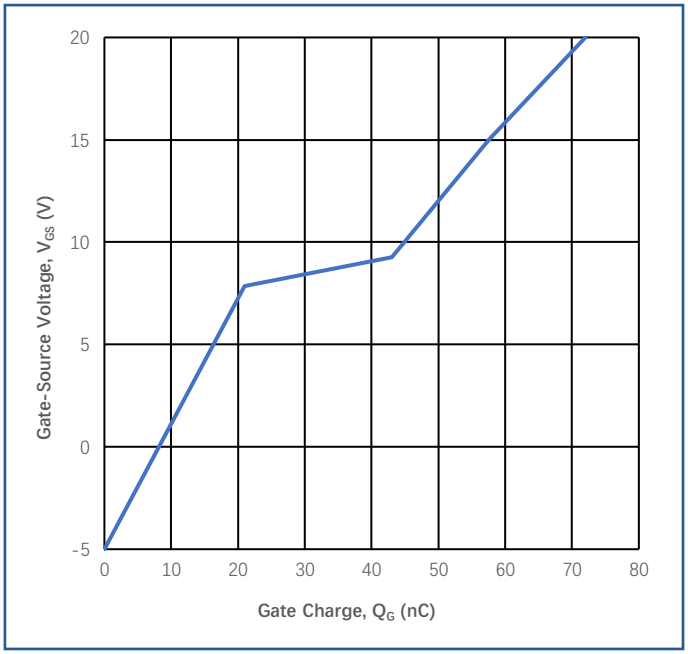


Fig 8
Gate Charge Characteristics

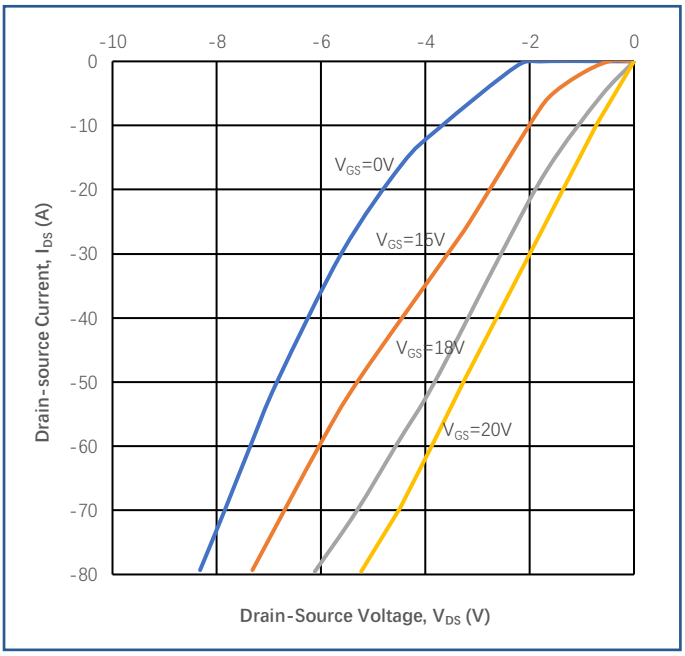


Fig 9

3rd Quadrant Characteristic at 25°C

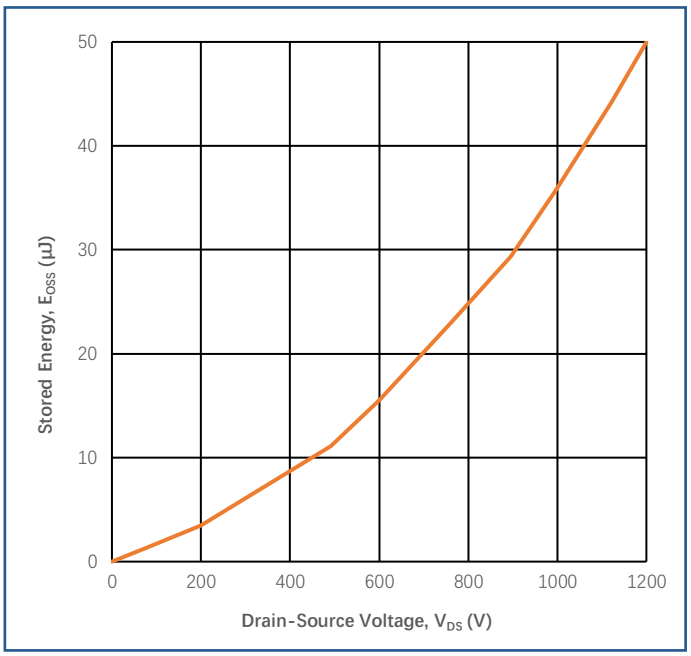


Fig 10

Output Capacitor Stored Energy

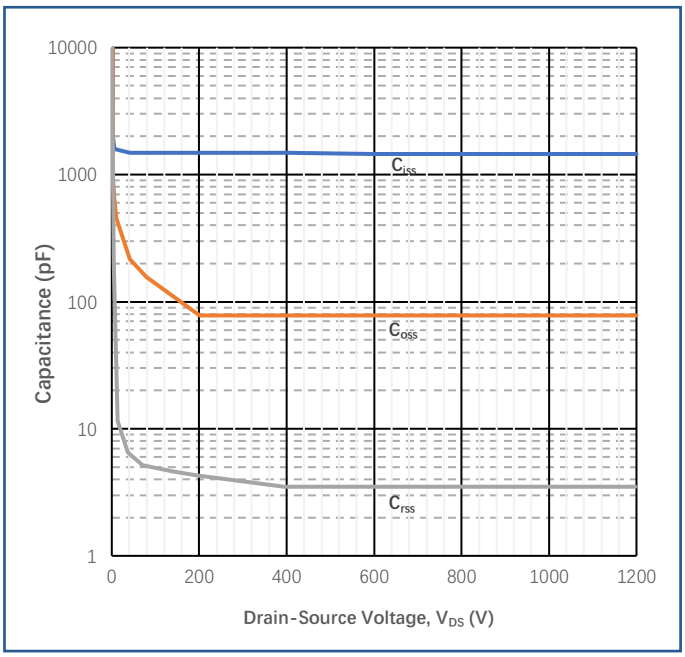


Fig 11

Capacitances vs. Drain-Source

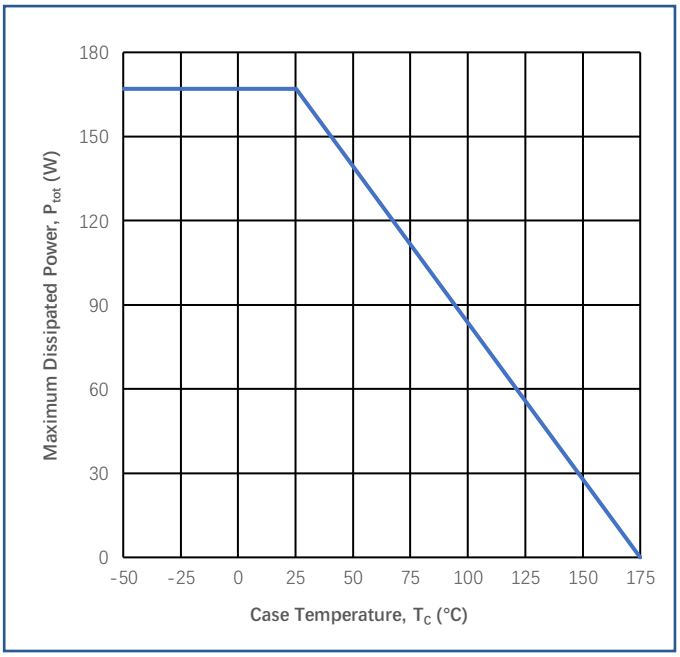


Fig 12

Max Power Dissipation Derating vs T_C

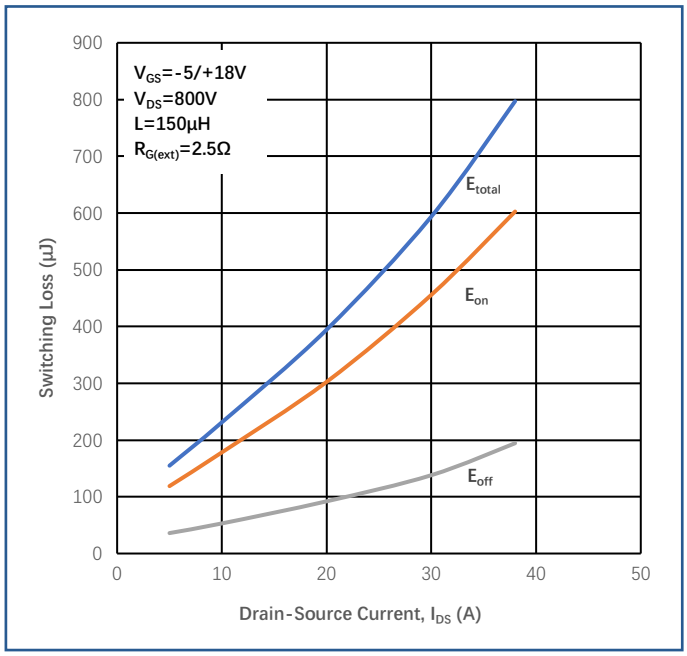


Fig 13
Switching Energy vs. Drain Current

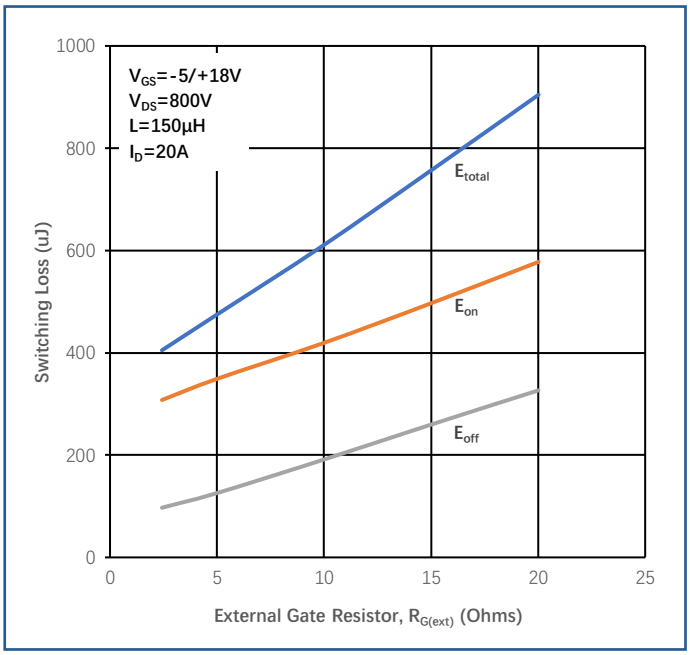


Fig 14
Switching Energy vs. $R_{G(ext)}$

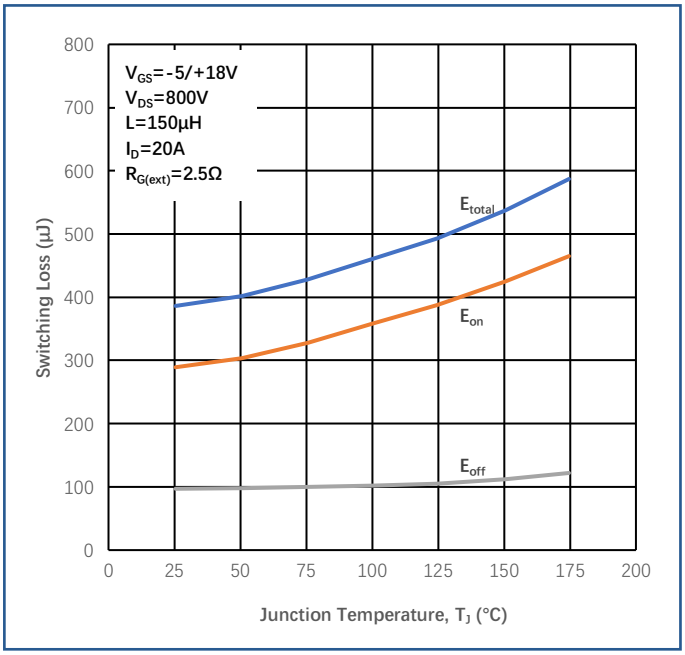


Fig 15
Switching Energy vs. Temperature

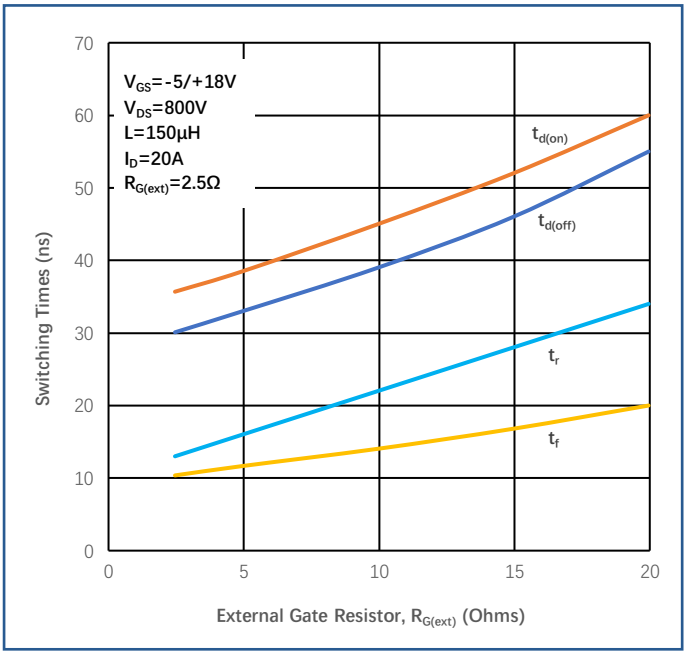


Fig 16
Switching Times vs. $R_{G(ext)}$

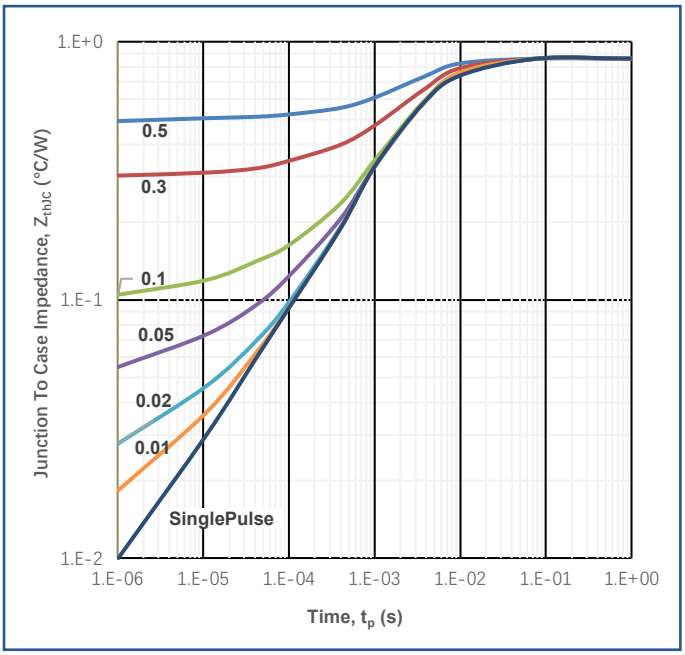


Fig 17
Transient Thermal Impedance

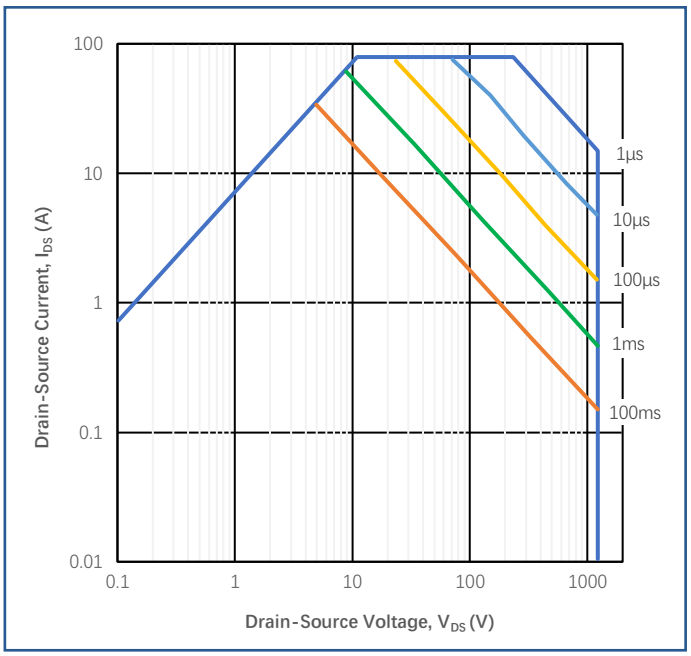
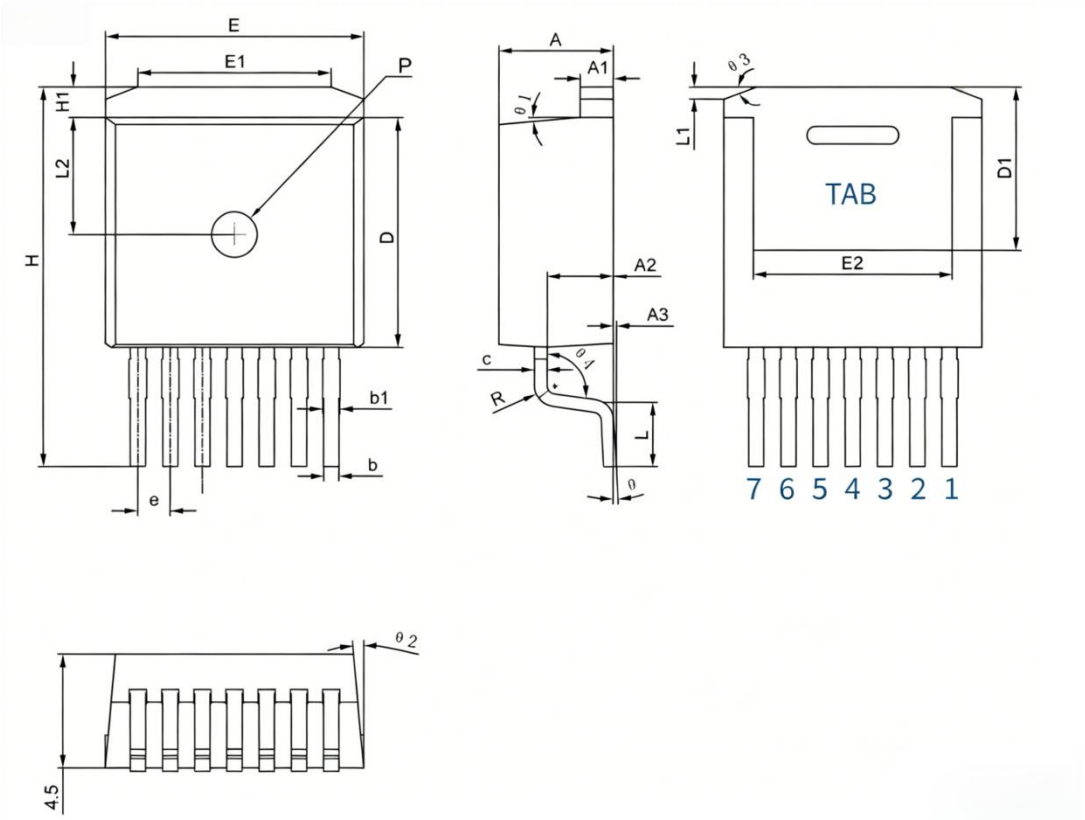


Fig 18
Safe Operating Area

Package Outlines(Unit:mm)

TO-263-7L



Symbol	Millimeters			Symbol	Millimeters		
	Min.	Type.	Max.		Min.	Type.	Max.
A	4.40	4.50	4.60	**e**	1.17	1.27	1.37
A1	1.25	1.30	1.40	**H**	14.75	15.00	15.25
A2	2.45	2.60	2.70	**H1**	1.10	1.20	1.30
A3	0.05	0.13	0.20	**L**	2.35	2.55	2.75
b	0.50	0.60	0.70	**L1**	0.37	0.57	0.77
b1	0.60	0.70	0.85	**L2**	4.48	4.63	4.78
c	0.45	0.50	0.60	**θ**	0°	3°	5°
D	8.88	9.08	9.28	**θ1**	3°	5°	7°
D1	6.25	6.45	6.65	**θ2**	3°	5°	7°
E	9.88	10.18	10.28	**θ3**	15°	20°	25°
E1	6.67	7.07	7.47	**R**	0.75	0.80	0.85
E2	7.67	7.82	7.97	**P**	1.70	1.80	1.90

Pin	Symbol	Description
1	G	Gate
2	KS	Driver Source
3-7	S	Power Source
TAB	D	Drain

Note:

1. All metal surfaces are Sn plated (matte), except area of cut.
2. Burr or mold flash size (0.5 mm) is not included in the dimensions.

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