1200V SiC N-Channel MOSFET

DESCRIPTION：

·High Speed Switching with Low Capacitances

·High Blocking Voltage with Low $R_{DS(ON)}$

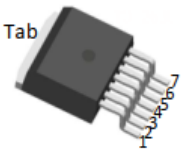
·Easy to Parallel

·Simple to Drive

·RoHS compliant.

·AEC-Q101 Qualified

V_{DS}	1200V
I_D	100A (Tc=25℃)
$R_{DS(ON)}$	37mΩ



TO-263-7L

TYPICAL APPLICATIONS：

·Power Factor Correction Modules

·Switch Mode Power Supplies

·DC-AC Inverters

·High Voltage DC-DC Converters

MAXIMUM RATINGS (at T_J = 25 °C, unless otherwise specified)

Characteristic	Condition	Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	1200	V
Continuous Drain Current	Tc=25℃ Tc=100℃	I_D	100 70	A
Peak Drain Current	Pulse width tp limited by T_{jmax}	I_{DM}	200	A
Gate-Source Voltage		V_{GSmax}	-8/+22	V
Recommend Gate-Source Voltage		V_{GSop}	-4/+18	V
Power Dissipation	Tc=25℃ Tc=100℃	P_{TOT}	465 232	W
Operation Junction temperature		Tj	-40~+175	℃
Storage temperature		T_{STG}	-40~+150	℃
Soldering Temperature		T_{sold}	260	℃

ELECTRICAL CHARATERISTICS (at T_J = 25 °C, unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage VGS = 0V, ID = 100μA	$V_{(BR)DSS}$	1200			V
Zero Gate Voltage Drain Current VDS = 1200 V, VGS = 0 V	I_{DSS}		1	5	uA
Gate-Source Leakage Current VGS = 18V, VDS = 0V	I_{GSS}			250	nA
Gate-Source Threshold Voltage VDS = VGS, ID = 10mA Tj=25℃ VDS = VGS, ID = 10mA Tj=175℃	$V_{GS(th)}$	2.0	2.6 2.0	4.0	V
Drain-Source On-State Resistance VGS = 15V, ID = 40A Tj=25℃ VGS = 15V, ID = 40A Tj=175℃ VGS = 18V, ID = 40A Tj=25℃ VGS = 18V, ID = 40A Tj=175℃	$R_{DS(on)}$		48 50 37 47	63 50 	mΩ
Forward Transconductance VDS = 20V, ID = 40A	g_{FS}		21		S
Input capacitance f=100KHz, VDS=1000 V, VGS=0 V	C_{iss}		2975		pF
Output capacitance f=100KHz, VDS=1000 V, VGS=0 V	C_{oss}		119		pF
Reverse transfer capacitance f=100KHz, VDS=1000 V, VGS=0 V	C_{rss}		12		pF
Coss Stored Energy f=100KHz, VDS=1000 V, VGS=0 V	E_{oss}		72		uJ
Internal Gate Resistance f=1MHz	$R_{G(INT)}$		2.1		Ω
Total Gate Charge VDS= 800V, ID= 40A,VGS= -4/18V	Q_G		117		nC
Gate to Source Charge VDS= 800V, ID= 40A,VGS= -4/18V	Q_{GS}		38		nC
Gate to Drain Charge VDS= 800V, ID= 40A,VGS= -4/18V	Q_{GD}		27		nC
Turn-on Delay Time VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=25℃ VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=125℃	$td_{(ON)}$		15 15		ns
Rise Time VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=25℃ VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=125℃	tr		23 23		ns
Turn-off Delay Time VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=25℃ VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=125℃	$td_{(OFF)}$		30 33		ns
Fall Time VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=25℃ VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=125℃	tf		8 6		ns
Turn-on Switching Energy VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=25℃ VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=125℃	$E_{(ON)}$		509 540		uJ
Turn-off Switching Energy VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=25℃ VDD=800V,ID=40A,VGS=-4/18V, RG=2.5Ω,L=200uH,Tj=125℃	$E_{(OFF)}$		97 98		uJ

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Typical	Unit
Thermal resistance, junction - case		$R_{th(j-C)}$	0.32	℃/W

Body Diode

ELECTRICAL CHARATERISTICS (at T_J = 25 °C, unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Diode Forward Voltage VGS = -4V, ISD =20A Tj=25℃ VGS = -4V, ISD =20A Tj=175℃	V_{SD}		5.0 4.4	6.6	V
Continuous Diode Forward Current VGS = -4V, Tc=25℃ VGS = -4V, Tc=100℃	I_S		76 44		A
Revers Recovery Time VR=800 V, ISD=40A, VGS= -4V,di/dt = 1670A/us, Tj=25℃ VR=800 V, ISD=40A, VGS= -4V,di/dt = 2400A/us, Tj=175℃	Trr		16 45		ns
Revers Recovery Charge VR=800 V, ISD=40A, VGS= -4V,di/dt = 1670A/us, Tj=25℃ VR=800 V, ISD=40A, VGS= -4V,di/dt = 2400A/us, Tj=175℃	Qrr		140 701		nC
Peak Revers Recovery Current VR=800 V, ISD=40A, VGS= -4V,di/dt = 1670A/us, Tj=25℃ VR=800 V, ISD=40A, VGS= -4V,di/dt = 2400A/us, Tj=175℃	I_{rrm}		14 26		A

Typical Characteristics

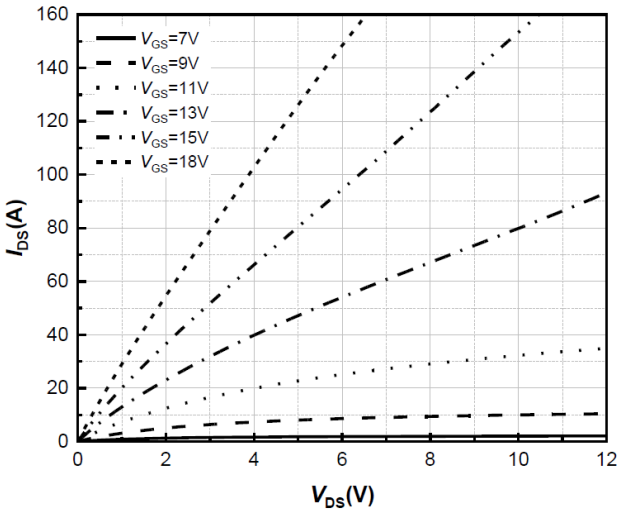


Figure 1. Output Characteristics (Tj=-40℃)

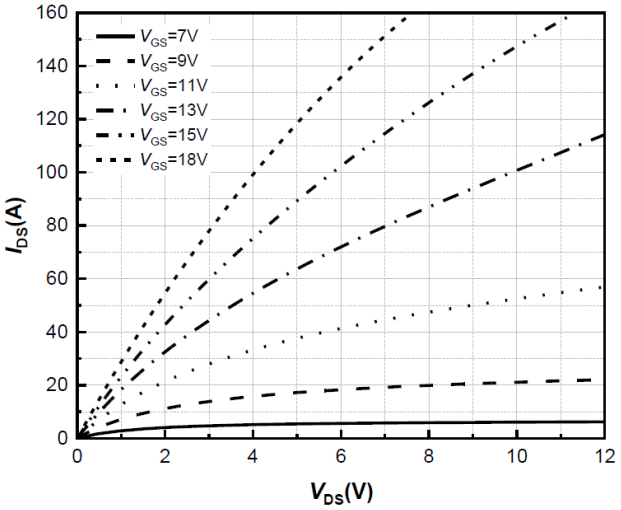


Figure 2. Output Characteristics (Tj=25℃)

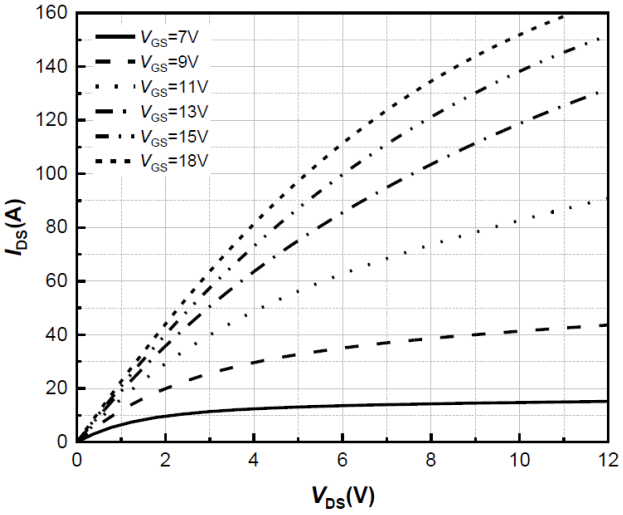


Figure 3. Output Characteristics(Tj=175℃)

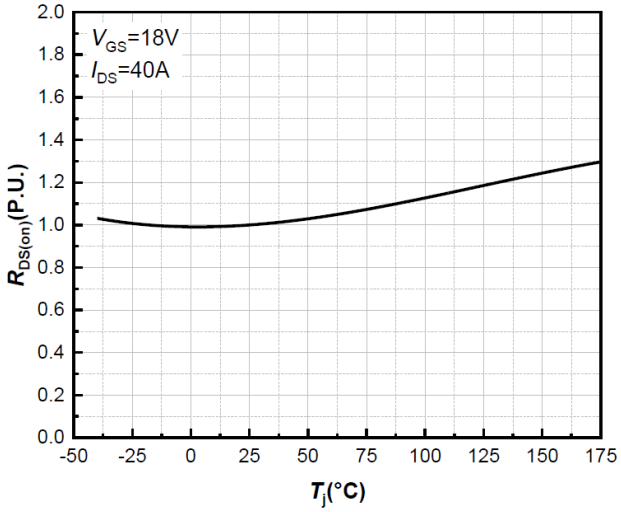


Figure 4. Normalized On-Resistance vs. Temperature

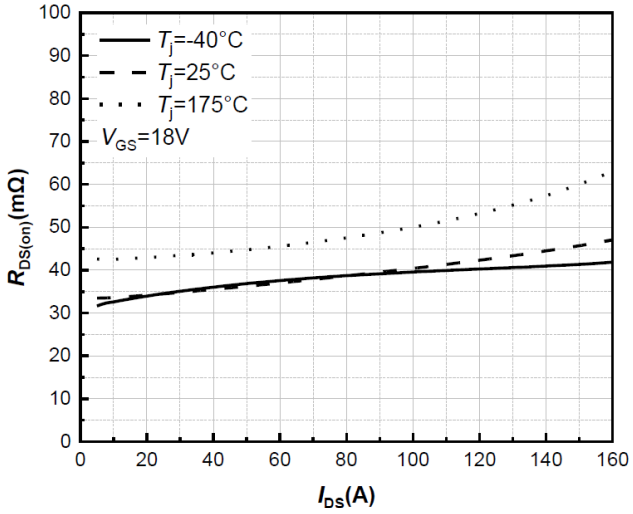


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

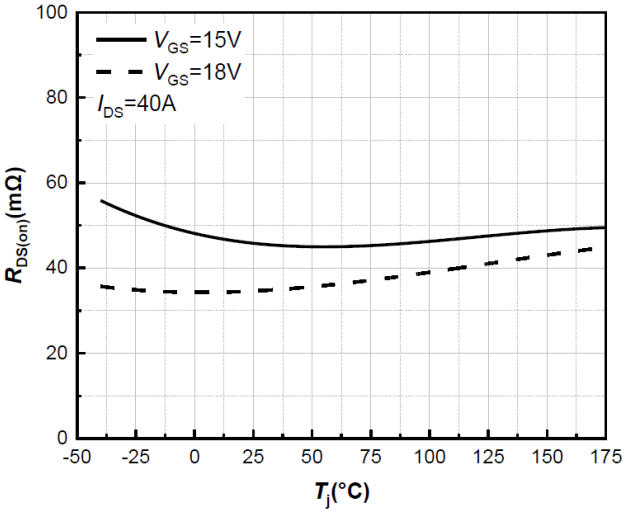


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

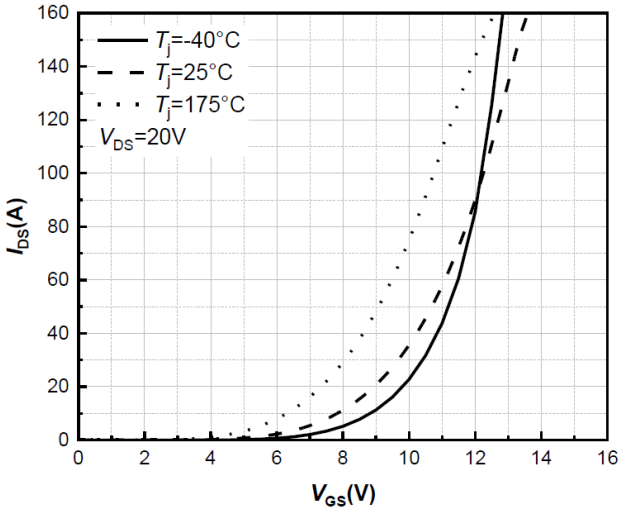


Figure 7. Transfer Characteristic for Various Junction Temperatures

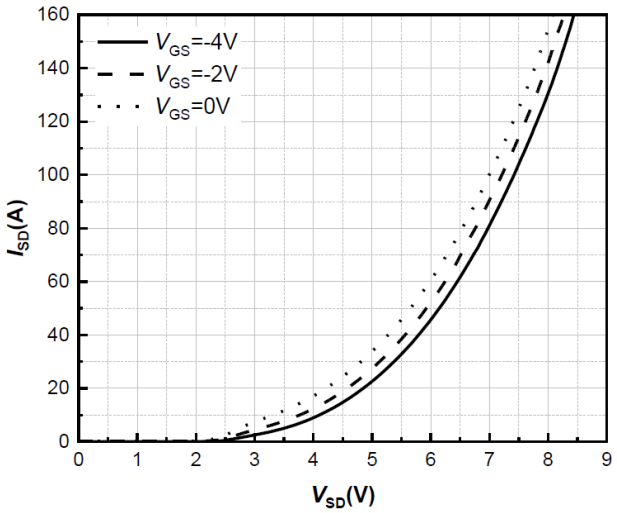


Figure 8. Body Diode Characteristic Tj=-40°C

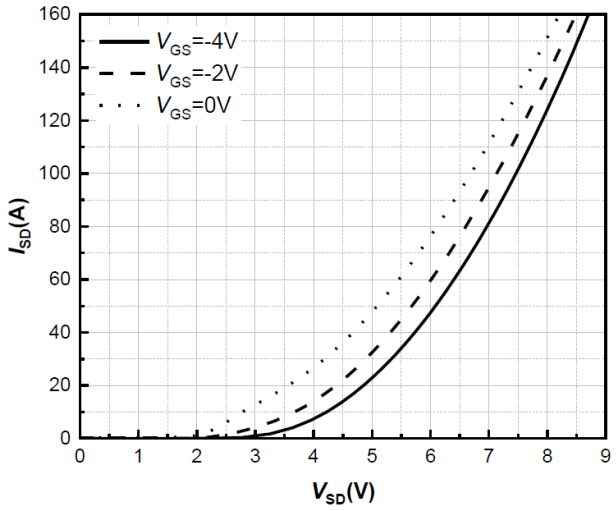


Figure 9. Body Diode Characteristic (Tj=25°C)

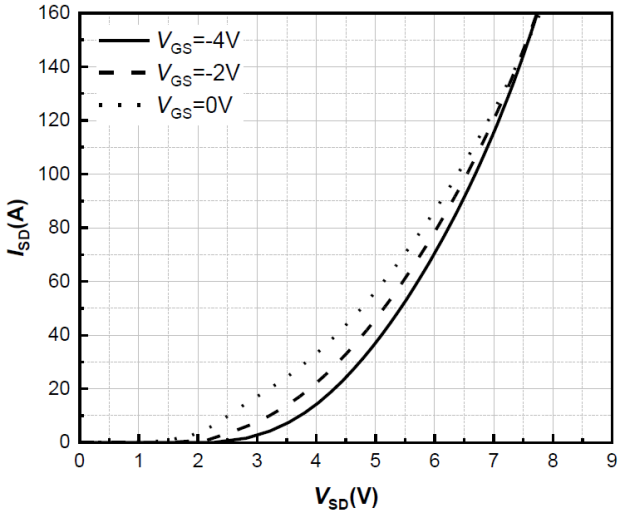


Figure 10. Body Diode Characteristic (Tj=175°C)

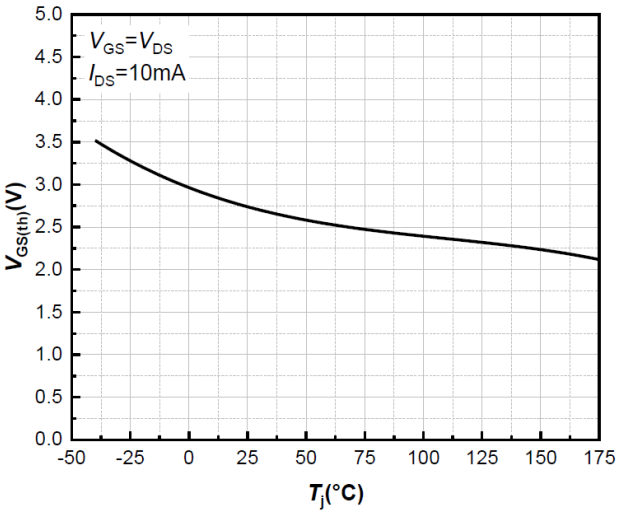


Figure 11. Threshold Voltage vs.Temperature

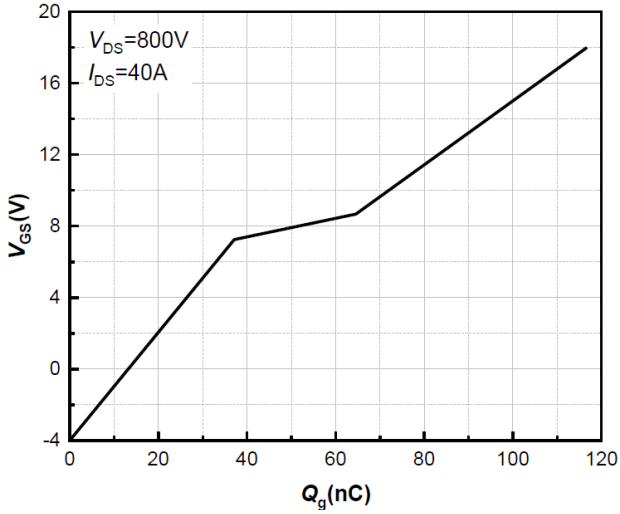


Figure 12. Gate Charge Characteristics

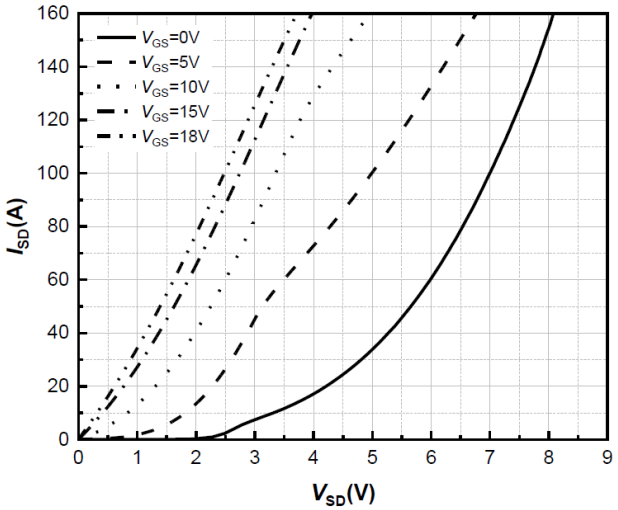


Figure 13. 3rd Quadrant Characteristic (Tj=-40°C)

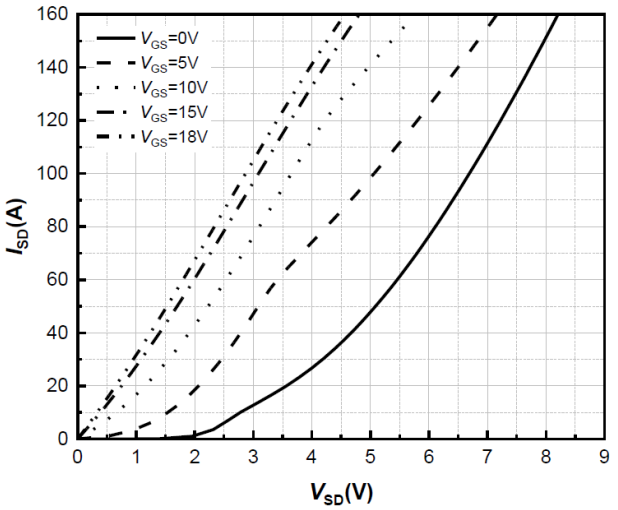


Figure 14. 3rd Quadrant Characteristic (Tj=25°C)

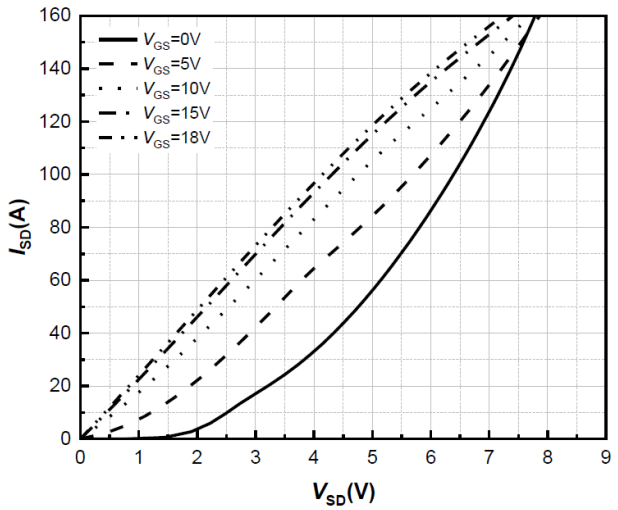


Figure 15. 3rd Quadrant Characteristic (Tj=175°C)

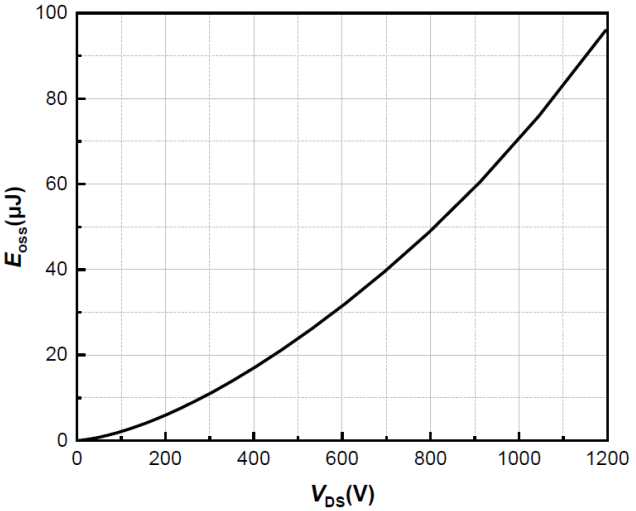


Figure 16. Output Capacitor Stored Energy

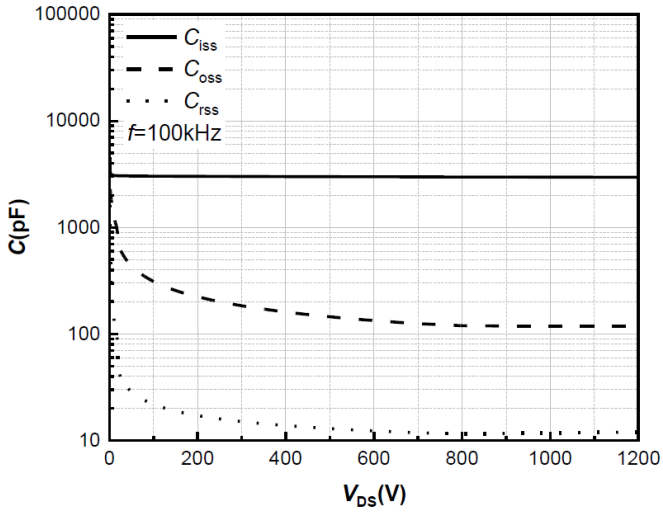


Figure 17. Capacitances vs. Drain-Source

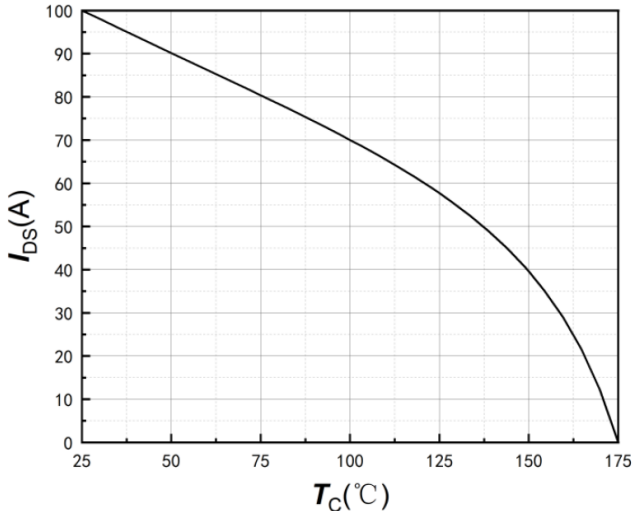


Figure 18. Continuous Drain Current Derating vs. Case Temperature

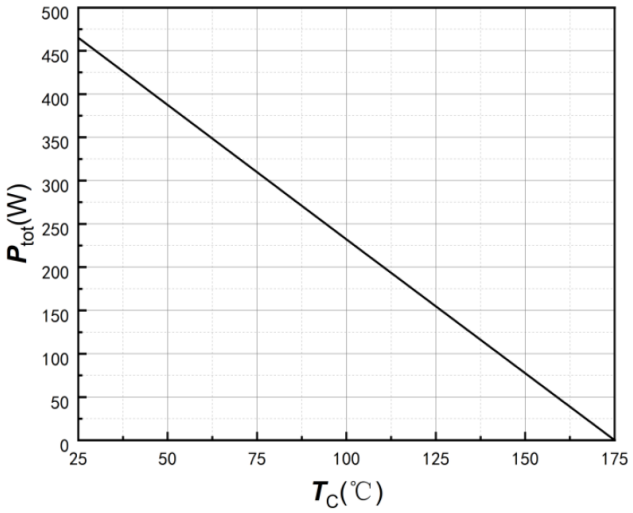


Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

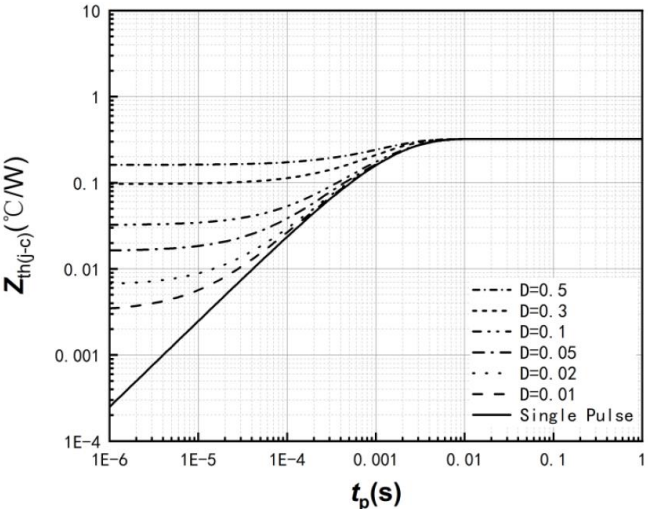


Figure 20. Transient Thermal Impedance

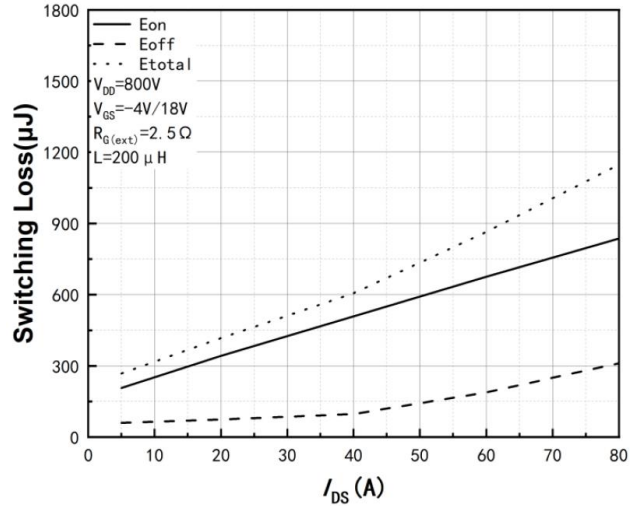


Figure 21. Clamped Inductive Switching Energy vs. Drain Current Tj=25°C

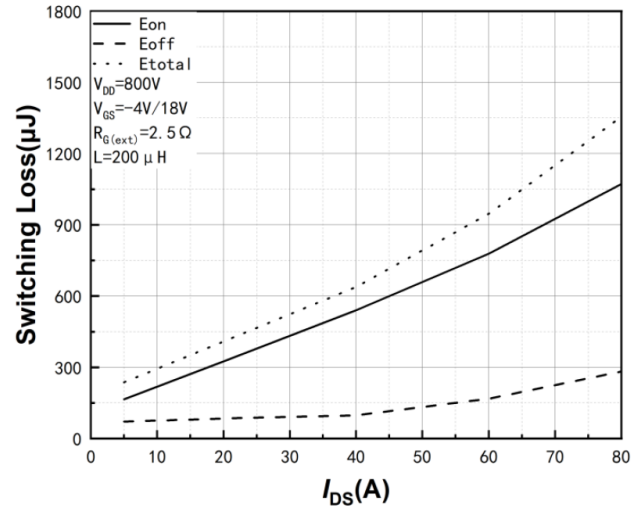


Figure 22. Clamped Inductive Switching Energy vs. Drain Current Tj=175°C

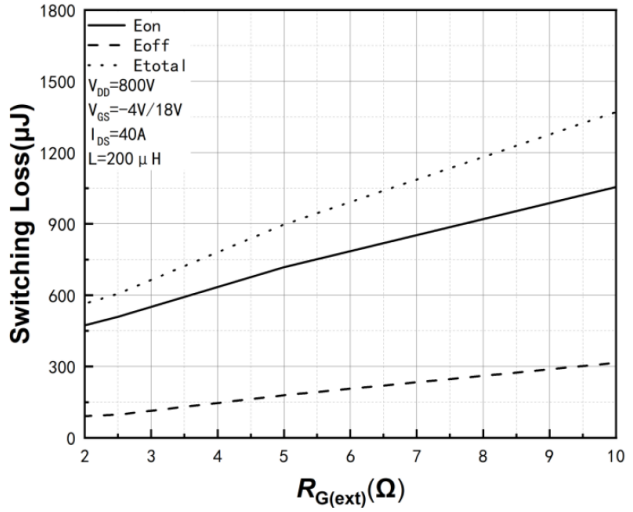


Figure 23. Clamped Inductive Switching Energy vs. RG(ext) Tj=25°C

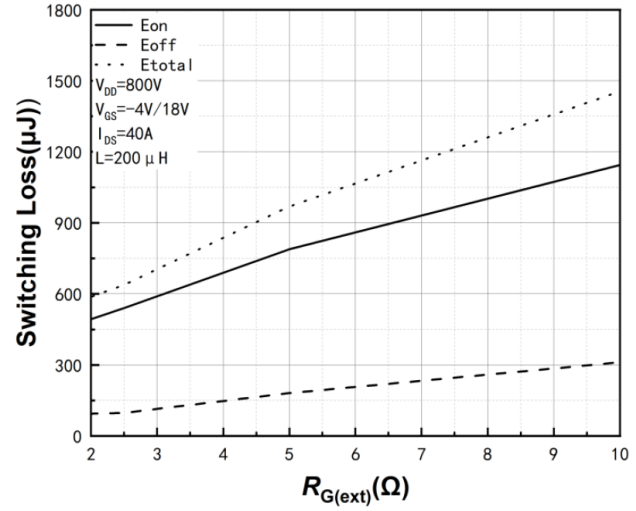


Figure 24. Clamped Inductive Switching Energy vs. RG(ext) Tj=175°C

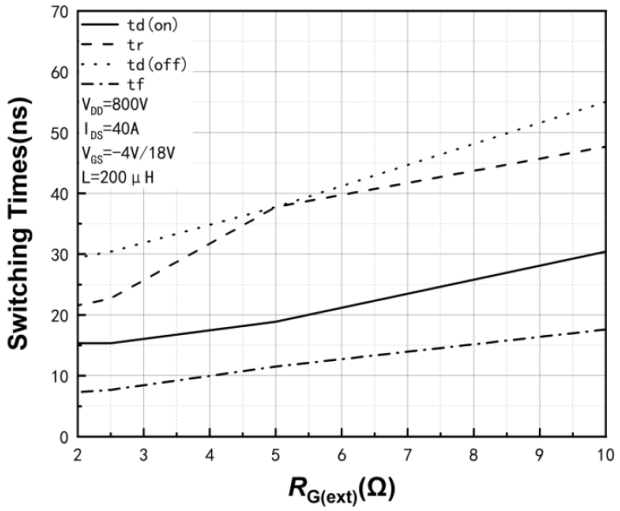


Figure 25. Switching Times vs. RG(ext)
Tj=25°C

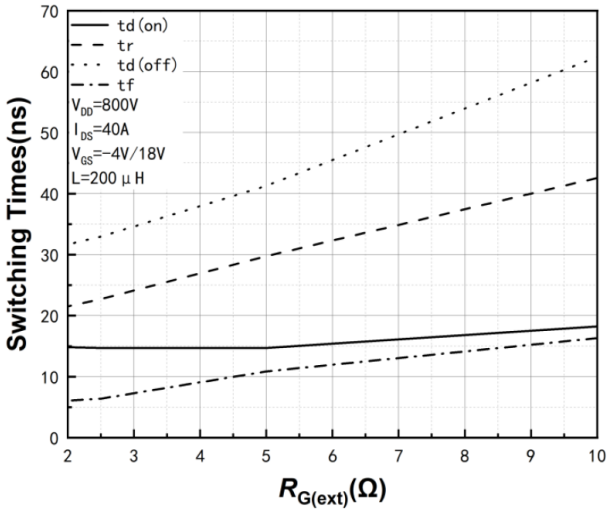


Figure 26. Switching Times vs. RG(ext)
Tj=175°C

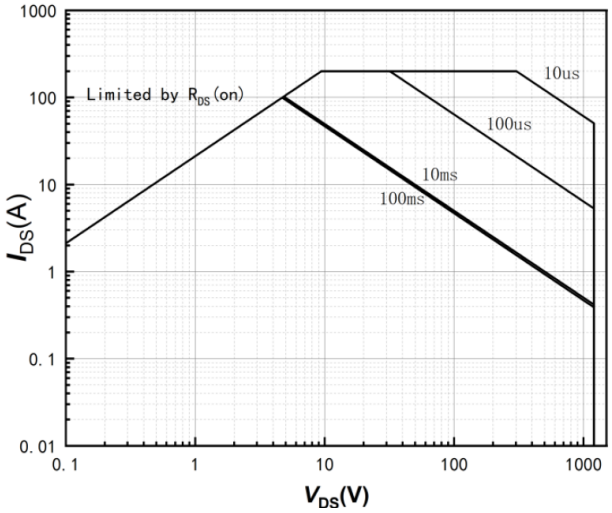
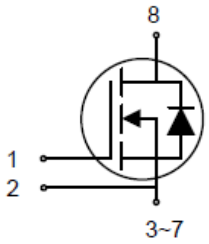


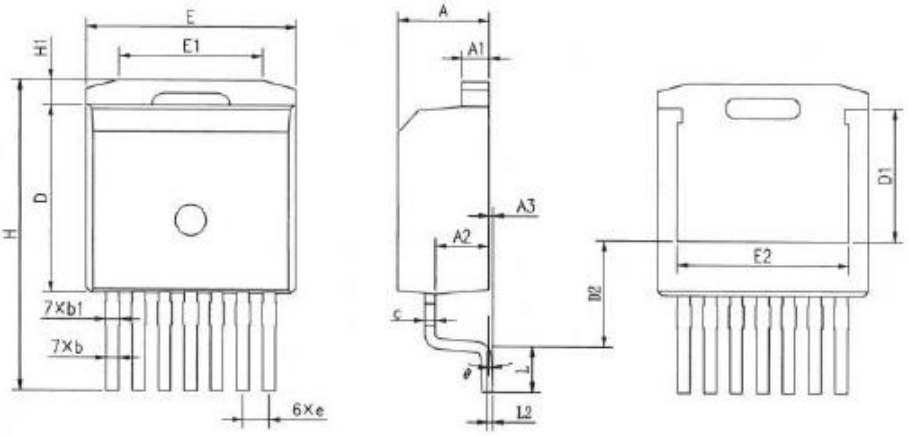
Figure 27. Safe Operating Area

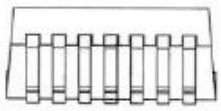
Figure 28.

·Circuit diagram



·TO-263-7L Package outlines : Dimensions in (mm)





SYMBOL	Unit: mm		
	MIN	NOM	MAX
A	4.30	4.43	4.56
A1	1.20	1.30	1.40
A2	2.45	2.60	2.75
A3	0.00	0.13	0.25
b	0.50	0.60	0.70
b1	0.60	0.70	0.90
c	0.45	0.50	0.60
D	8.93	9.08	9.23
D1	6.30	6.45	6.60
D2	5.18 REF		
e	1.27 BSC		
E	10.08	10.18	10.28
E1	7.00 REF		
E2	7.90	8.30	8.70
H	14.53	15.03	15.53
H1	0.98	1.20	1.42
L	1.90	2.20	2.50
L2	0.25 BSC		
θ	0°	3°	7°

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