MOSPEC

MIM022N170D

1700V SiC N-Channel MOSFET

DESCRIPTION：
- High Speed Switching
- High Blocking Voltage with Low $R_{DS(ON)}$
- Easy to Parallel
- Simple to Drive
- RoHS compliant.

V_{DSS}	1700V
I_D	143A
$R_{DS(ON)_Typ.}$ @V_{GS}=18V	22mΩ

TYPICAL APPLICATIONS：
- Power Factor Correction Modules
- Switch Mode Power Supplies
- DC-AC Inverters
- High Voltage DC-DC Converters



TO-247-3L

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

Characteristic	Condition	Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	1700	V
Continuous Drain Current	Tc=25℃ Tc=100℃	I_D	143 101	A
Peak Drain Current	Pulse width tp limited by Tjmax	I_{DM}	286	A
Gate-Source Voltage	tp≤0.5μs, D<0.001	V_{GSmax}	-10/+22	V
Recommend Gate-Source Voltage		V_{GSop}	-4/+18	V
Power Dissipation	Tc=25℃ Tc=100℃	P_{TOT}	750 375	W
Operation Junction temperature		Tj	-40~+175	℃
Storage temperature		T_{STG}	-40~+150	℃

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Typical	Unit
Thermal resistance, junction - case		$R_{th(j-C)}$	0.2	℃/W

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

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage VGS = 0V, ID = 100μA	$V_{(BR)DSS}$	1700			V
Zero Gate Voltage Drain Current VDS = 1700 V, VGS = 0 V	I_{DSS}		1		uA
Gate-Source Leakage Current VGS = 18V, VDS = 0V	I_{GSS}			250	nA
Gate-Source Threshold Voltage VDS = VGS, ID = 20mA Tj=25℃ VDS = VGS, ID = 20mA Tj=175℃	$V_{GS(th)}$	2.0	2.7 1.9	4.0	V
Drain-Source On-State Resistance VGS = 18V, ID = 80A Tj=25℃ VGS = 18V, ID = 80A Tj=175℃	$R_{DS(on)}$		22 32		mΩ
Internal Gate Resistance f=1MHz	$R_{G(INT)}$		4.4		Ω
Input capacitance f=100KHz, VDS=1200 V, VGS=0 V	C_{iss}		5133		pF
Output capacitance f=100KHz, VDS=1200 V, VGS=0 V	C_{oss}		187		pF
Reverse transfer capacitance f=100KHz, VDS=1200 V, VGS=0 V	C_{rss}		8		pF
Total Gate Charge VDD= 1200V, ID= 80A,VGS= -4/18V	Q_G		207		nC
Gate to Source Charge VDD= 1200V, ID= 80A,VGS= -4/18V	Q_{GS}		69		nC
Gate to Drain Charge VDD= 1200V, ID= 80A,VGS= -4/18V	Q_{GD}		48		nC
Turn-on Delay Time VDD= 1200V, ID= 80A,VGS= -4/18V, RG(ext)=2.5Ω L= 200uH	$td_{(ON)}$		28		ns
Rise Time VDD= 1200V, ID= 80A,VGS= -4/18V, RG(ext)=2.5Ω L= 200uH	tr		47		ns

Turn-off Delay Time VDD= 1200V, ID= 80A,VGS= -4/18V, RG(ext)=2.5Ω L= 200uH	$td_{(OFF)}$		53		ns
Fall Time VDD= 1200V, ID= 80A,VGS= -4/18V, RG(ext)=2.5Ω L= 200uH	tf		18		ns
Turn-on Switching Energy VDD= 1200V, ID= 80A,VGS= -4/18V, RG(ext)=2.5Ω L= 200uH	$E_{(ON)}$		2838		uJ
Turn-off Switching Energy VDD= 1200V, ID= 80A,VGS= -4/18V, RG(ext)=2.5Ω L= 200uH	$E_{(OFF)}$		895		uJ

Body Diode

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

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Diode Forward Voltage VGS = -4V, ISD = 40A Tj=25℃ VGS = -4V, ISD = 40A Tj=175℃	V_{SD}		4.4 3.8		V
Diode Forward Voltage VGS = -4V, ISD = 80A Tj=25℃ VGS = -4V, ISD = 80A Tj=175℃	V_{SD}		5.0 4.3		V
Continuous Diode Forward Current VGS = -4V, Tc=25℃ VGS = -4V, Tc=100℃	I_S		120 52		A
Revers Recovery Time VR=1200 V, ISD=80A, VGS= -4V, di/dt = 3842A/us	Trr		51		ns
Revers Recovery Charge VR=1200 V, ISD=80A, VGS= -4V, di/dt = 3842A/us	Qrr		735		nC
Peak Revers Recovery Current VR=1200 V, ISD=80A, VGS= -4V, di/dt = 3842A/us	I_{rrm}		40		A

Typical Characteristics

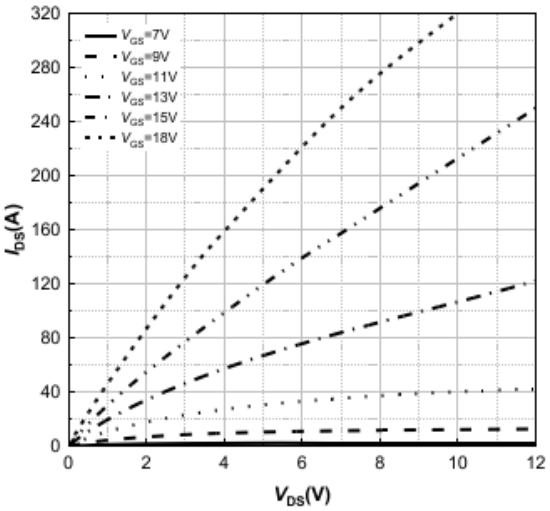


Figure 1. Typical output characteristics (Tj=-40℃)

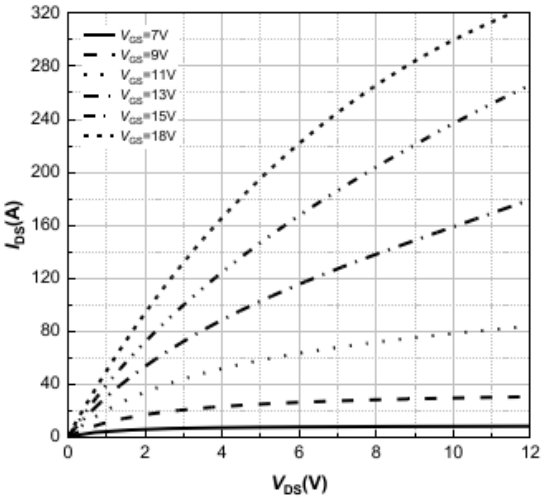


Figure 2. Typical output characteristics (Tj=25℃)

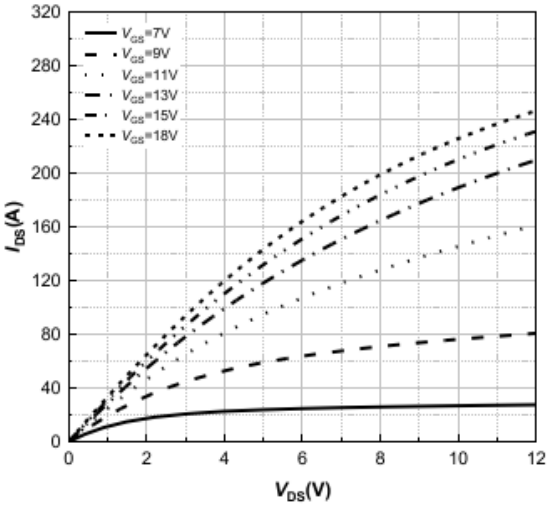


Figure 3. Output Characteristics
Tj=175°C

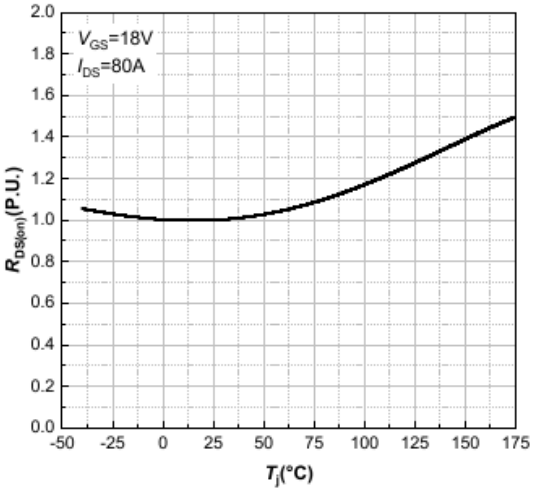


Figure 4. Normalized On-Resistance vs. Temperature

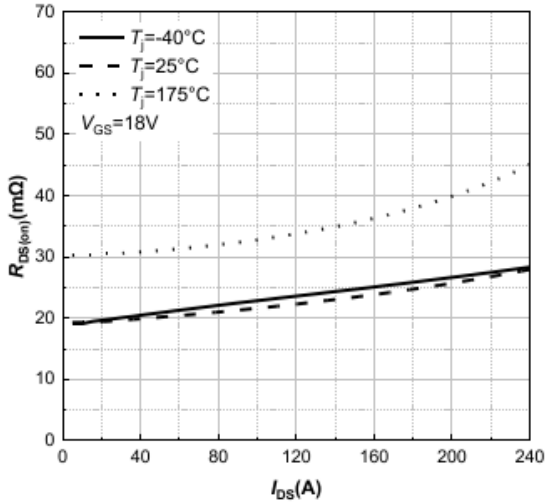


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

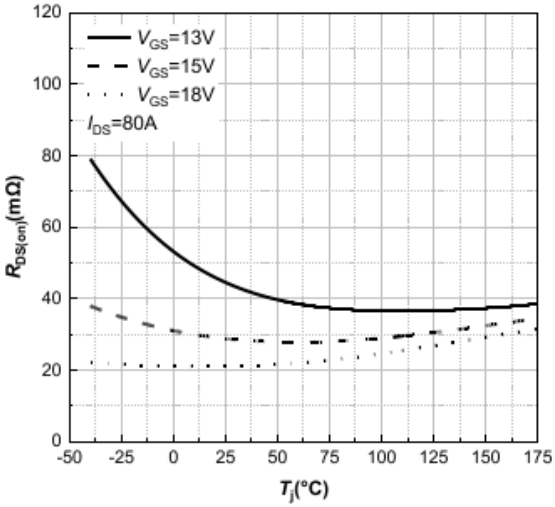


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage

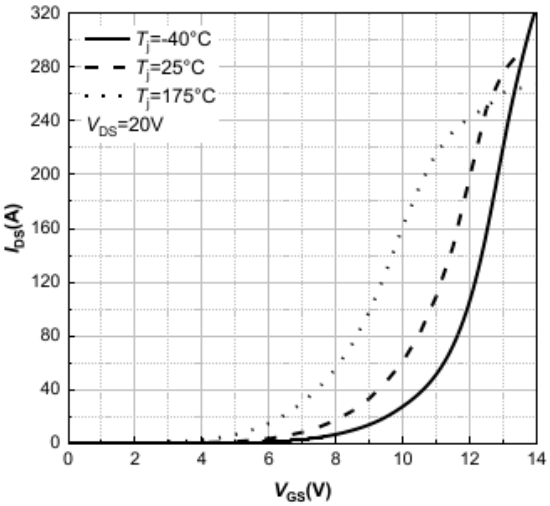


Figure 7. Transfer Characteristic for Various Junction Temperatures

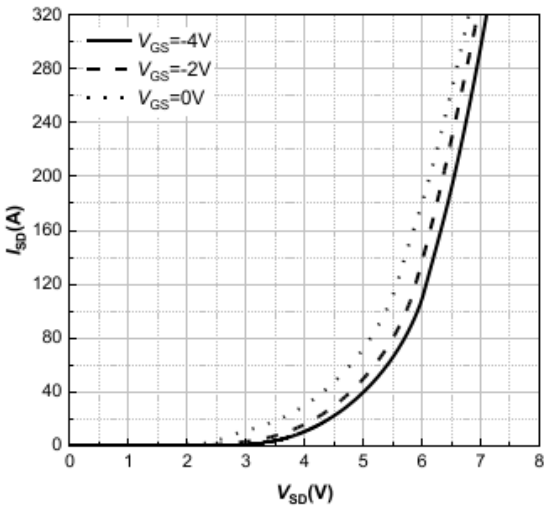


Figure 8. Body Diode Characteristic Tj=-40°C

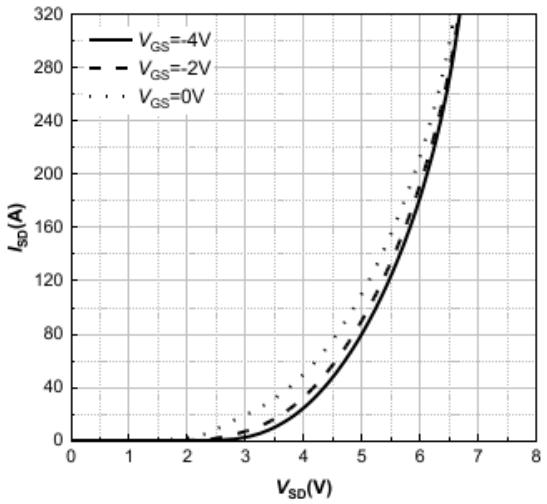


Figure 9. Body Diode Characteristic Tj=25°C

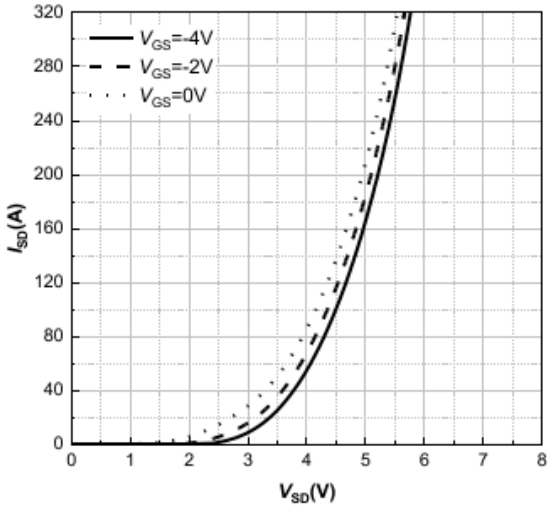


Figure 10. Body Diode Characteristic Tj=175°C

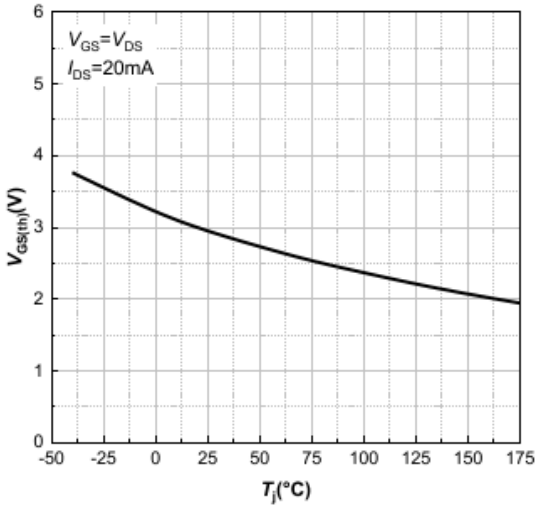


Figure 11. Threshold Voltage vs Temperature

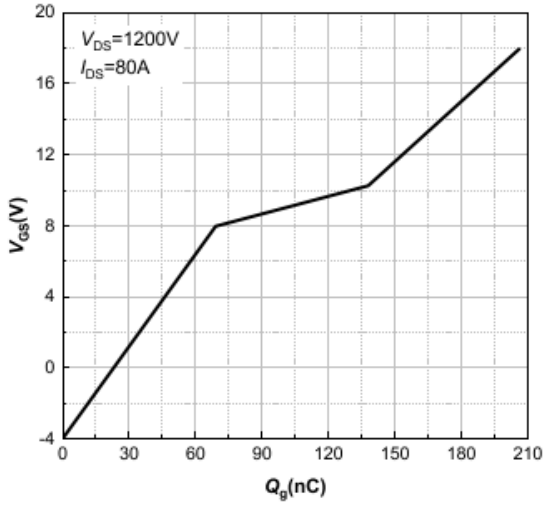


Figure 12. Gate Charge Characteristics

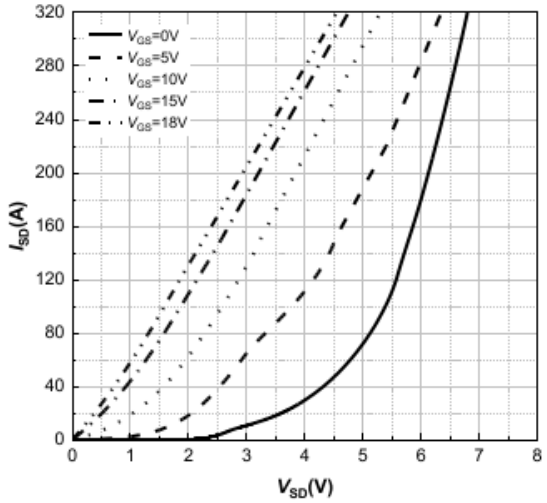


Figure 13. 3rd Quadrant Characteristic Tj=-40°C

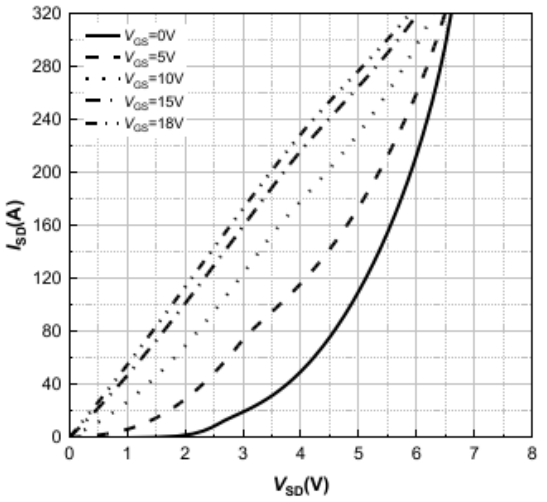


Figure 14. 3rd Quadrant Characteristic Tj=25°C

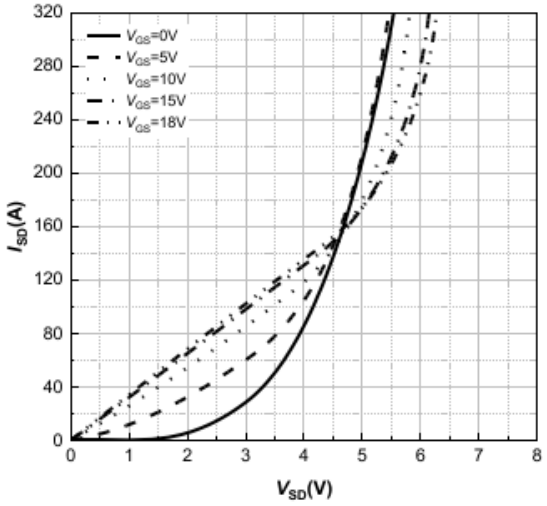


Figure 15. 3rd Quadrant Characteristic Tj=175°C

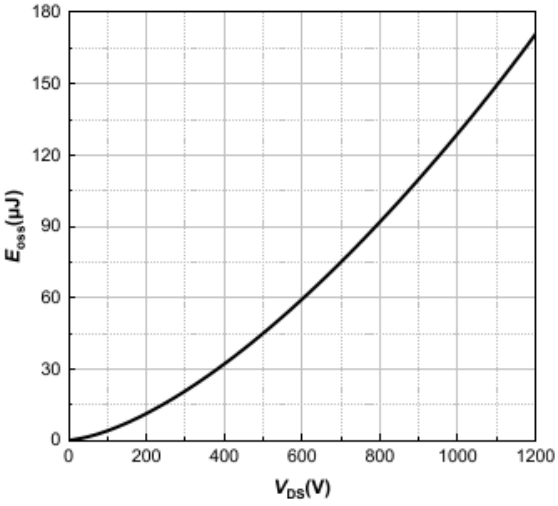


Figure 16. Output Capacitor Stored Energy

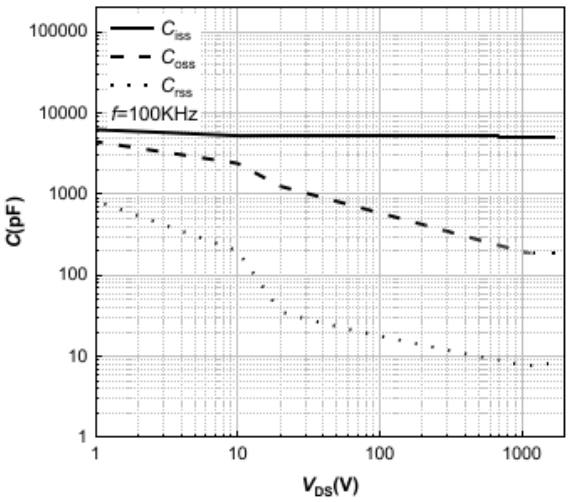


Figure 17. Capacitances vs. Drain-Source

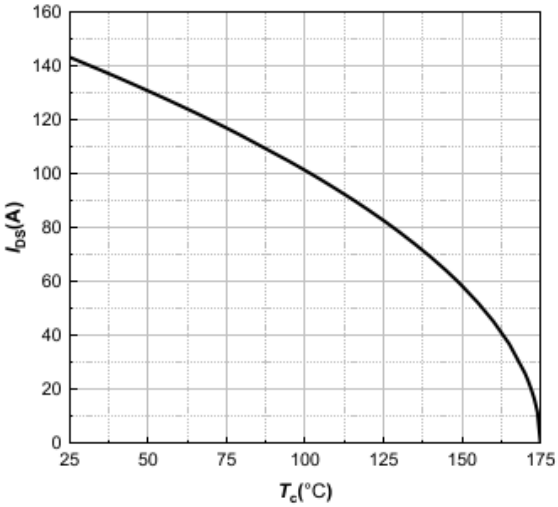


Figure 18. Continuous Drain Current Derating vs. Case Temperature

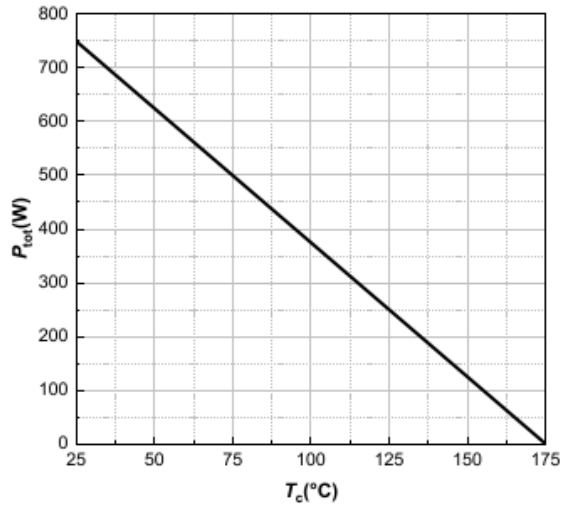


Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

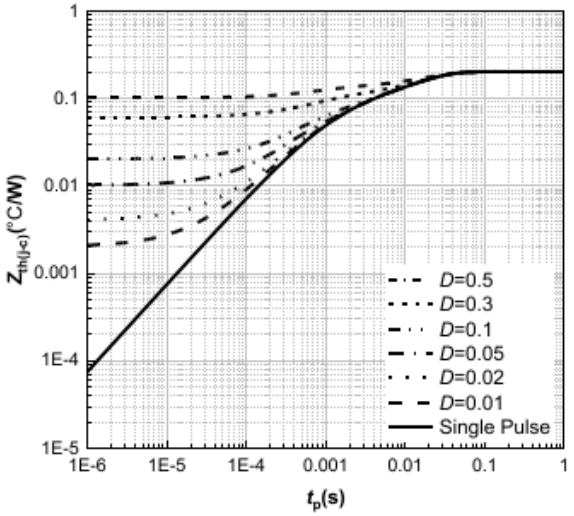


Figure 20. Transient Thermal Impedance

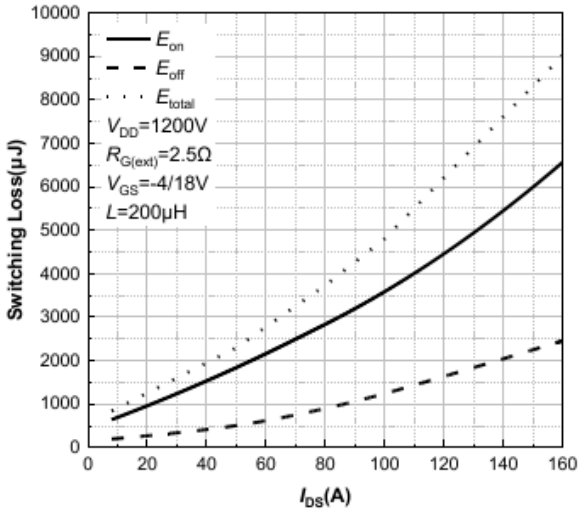


Figure 21. Clamped Inductive Switching Energy vs. Drain Current Tj=25°C

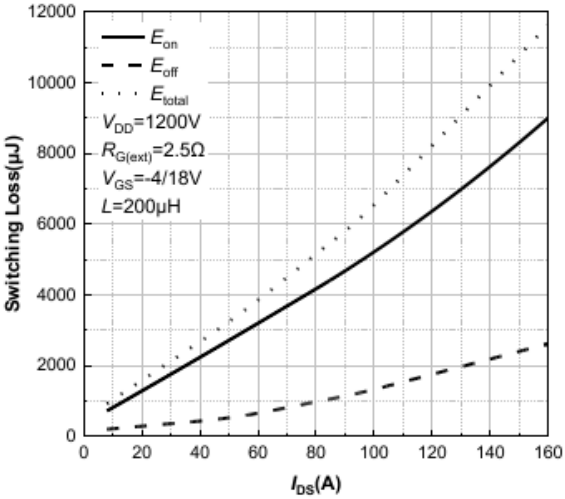


Figure 22. Clamped Inductive Switching Energy vs. Drain Current Tj=25°C

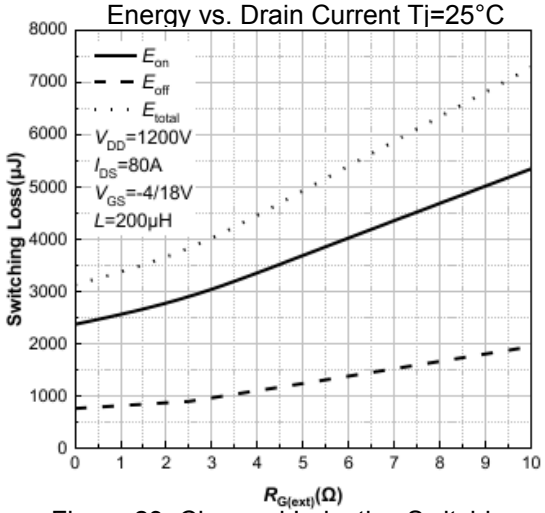


Figure 23. Clamped Inductive Switching Energy vs. RG(ext) Tj=25°C

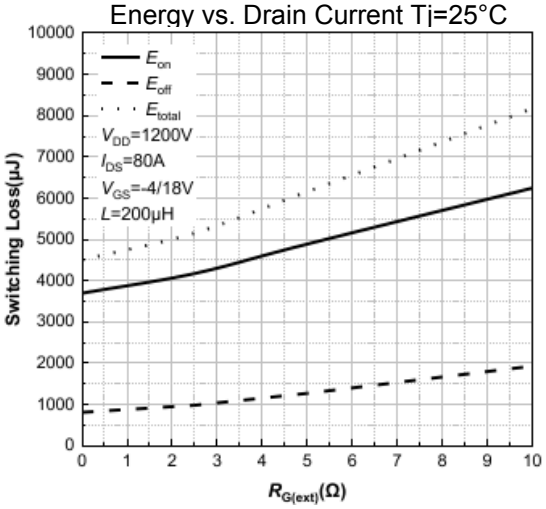


Figure 24. Clamped Inductive Switching Energy vs. RG(ext) Tj=175°C

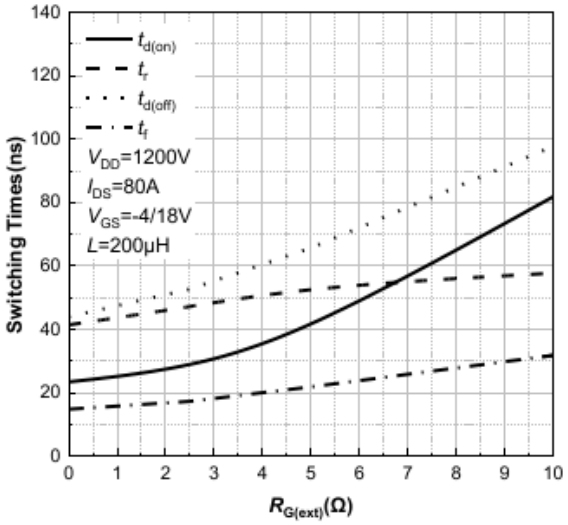


Figure 25. Switching Times vs. RG(ext) Tj=25°C

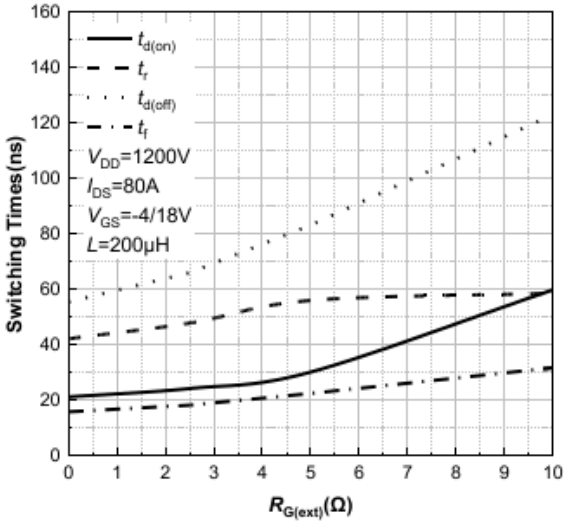


Figure 26. Switching Times vs. RG(ext) Tj=175°C

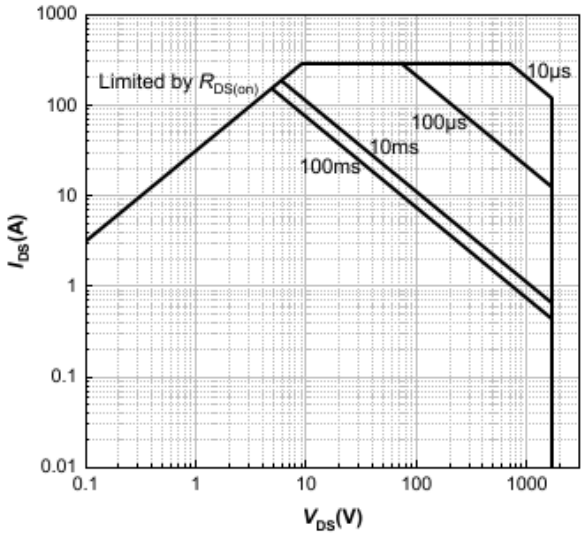
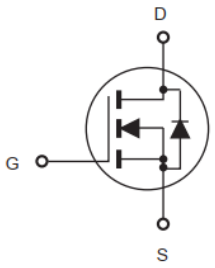
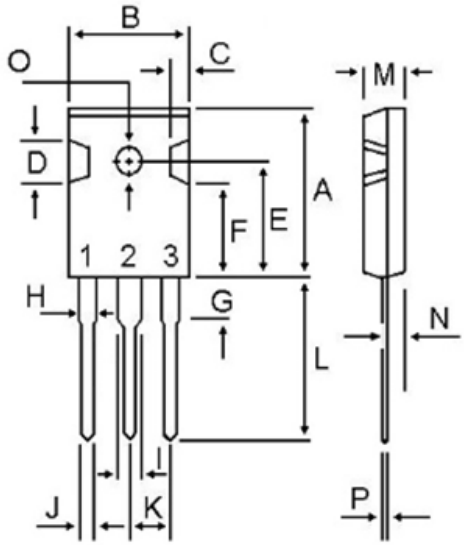


Figure 27. Safe Operating Area

• Circuit diagram



• TO-247-3L Package outlines : Dimensions in (mm)



DIM	MILLIMETERS	
	MIN	MAX
A	20.80	21.80
B	15.38	16.20
C	1.90	2.70
D	5.10	6.10
E	14.50	15.50
F	11.20	13.20
G	3.75	4.35
H	1.90	2.30
I	2.90	3.30
J	1.00	1.40
K	5.26	5.66
L	19.50	20.50
M	4.68	5.36
N	2.30	2.60
O	3.45	3.85
P	0.48	0.72

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