MOSPEC

MIM270N65E

650V SiC N-Channel MOSFET

V_{DS}	650V
I_D	13A (Tc=25℃)
$R_{DS(ON)}$	270mΩ

DESCRIPTION：

·High Speed Switching with Low Capacitances

·High Blocking Voltage with Low RDS(on)

·Easy to parallel

·Simple to drive

·RoHS compliant

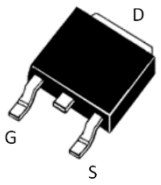
·Increased Power Density

·Faster Operating Freequency

·Reduction of Heat Sink Requirements

·Higher Efficiency

·Reduced EMI



TO-252

TYPICAL APPLICATIONS：

·Power Factor Correction Modules

·Switch Mode Power Supplies

·DC-AC Inverters

·High Voltage DC/DC Converters

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

Characteristic	Condition	Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	650	V
Continuous Drain Current	Tc=25℃ Tc=100℃	I_D	13 9.2	A
Peak Drain Current	Pulse width tp limited by T_{jmax}	I_{DM}	24	A
Gate-Source Voltage		$V_{GS\ max}$	-8/+22	V
Recommend Gate-Source Voltage		$V_{GS\ op}$	-4/+18	V
Power dissipation	T_C=25℃ T_C=100℃	P_{tot}	57 28.5	W
Junction & Storage temperature Range		T_J, T_{STG}	-40~+175	℃

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

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage VGS = 0V, ID = 100uA	$V_{(BR)DSS}$	650			V
Zero Gate Voltage Drain Current VDS = 650 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 = 1.33mA, Tj=25°C VDS = VGS, ID = 1.33mA, Tj=175°C	$V_{GS(th)}$	2	3.1 2.2	4	V
Drain-Source On-State Resistance VGS = 15V, ID = 4.5A, Tj=25°C VGS = 15V, ID = 4.5A, Tj=175°C VGS = 18V, ID = 4.5A, Tj=25°C VGS = 18V, ID = 4.5A, Tj=175°C	$R_{DS(on)}$		370 340 270 298	500 357	mΩ
Internal Gate Resistance f = 1MHz	$R_{G\ (int)}$		3.6		Ω
Input capacitance f=1MHz, VDS= 600 V, VGS=0 V	C_{iss}		203		pF
Output capacitance f=1MHz, VDS= 600 V, VGS=0 V	C_{oss}		26		pF
Reverse transfer capacitance f=1MHz, VDS= 600 V, VGS=0 V	C_{rss}		3.5		pF
Total Gate Charge VDS= 400V, ID= 4.5A,VGS= -4/18V	Q_G		11.2		nC
Gate to Source Charge VDS= 400V, ID= 4.5A,VGS= -4/18V	Q_{GS}		2		nC
Gate to Drain Charge VDS= 400V, ID= 4.5A,VGS= -4/18V	Q_{GD}		5.2		nC
Turn-on delay time VDD=400V,VGS= -4V/18V, ID= 4.5A,R_G =2.5Ω,L=200μH	$td_{\ (ON)}$		3		ns
Rise time VDD=400V,VGS= -4V/18V, ID= 4.5A,R_G =2.5Ω,L=200μH	tr		8		ns
Turn-off delay time VDD=400V,VGS= -4V/18V, ID= 4.5A,R_G =2.5Ω,L=200μH	$td_{\ (OFF)}$		6		ns
Fall time VDD=400V,VGS= -4V/18V, ID= 4.5A,R_G =2.5Ω,L=200μH	tf		11		ns
Turn-On Energy VDD=400V,VGS= -4V/18V, ID= 4.5A,R_G =2.5Ω,L=200μH	Eon		21		μJ
Turn-Off Energy VDD=400V,VGS= -4V/18V, ID= 4.5A,R_G =2.5Ω,L=200μH	Eoff		5		μJ

Body Diode

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

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Diode Forward Voltage VGS = -4V, I_{SD} = 2.5A, T_j=25°C VGS = -4V, I_{SD} = 2.5A, T_j=175°C VGS = -4V, I_{SD} = 4.5A, T_j=25°C VGS = -4V, I_{SD} = 4.5A, T_j=175°C	V_{SD}		4.0 3.6 4.5 4.0		V
Maximum Continuous Body Diode Forward Current VGS = -4V, T_C=25°C VGS = -4V, T_C=100°C	I_S		13 6.5		A
Peak Reverse Recovery Current VGS = -4V, I_{SD} = 4.5A,V_R= 400V, di/dt = 1000A/us	I_{mm}		4		A
Revers Recovery Time VGS = -4V, I_{SD} = 4.5A,V_R= 400V, di/dt = 1000A/us	Trr		10		ns
Revers Recovery Charge VGS = -4V, I_{SD} = 4.5A,V_R= 400V, di/dt = 1000A/us	Qrr		56		nC

THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Case	$R_{th(j-c)}$	2.63	℃/W

Typical Performance Characteristics

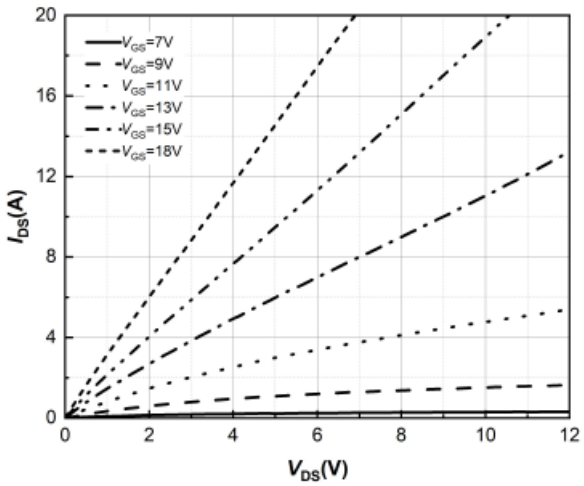


Figure 1. Output Characteristics T_J=-40°C

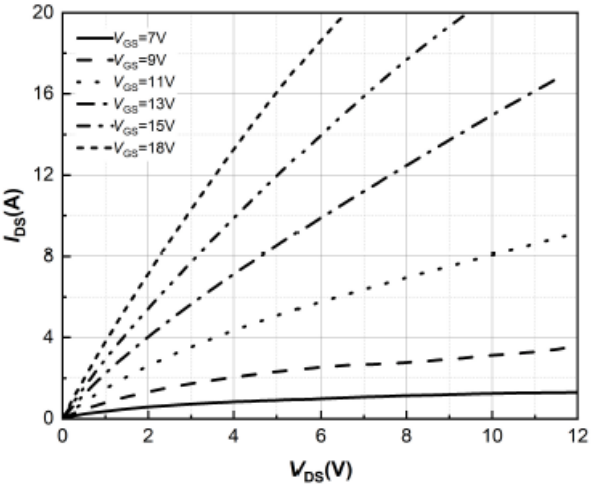


Figure 2. Output Characteristics

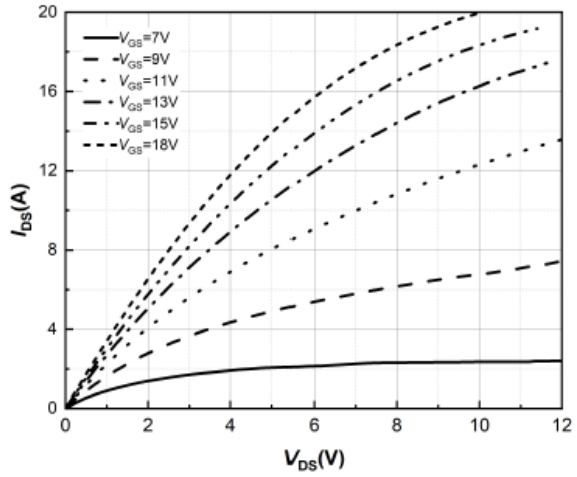


Figure 3. Output Characteristics T_J=175°C

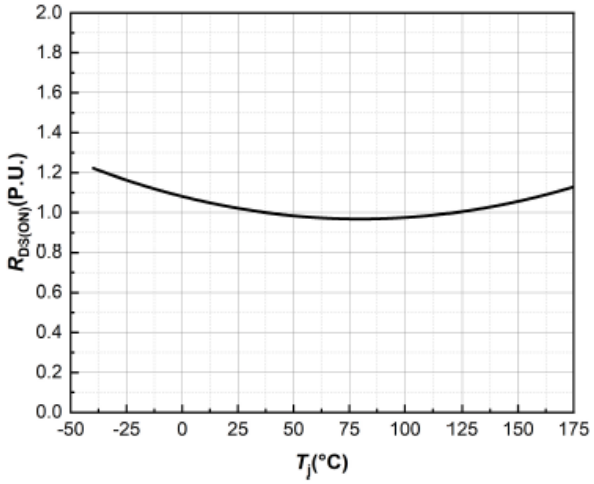


Figure 4. Normalized On-Resistance vs. Temperature

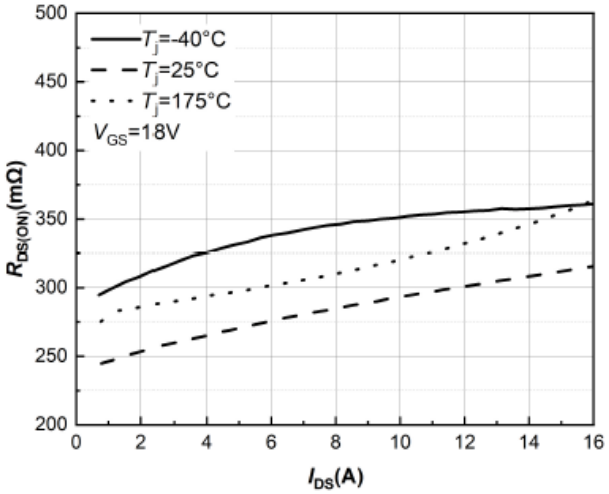


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

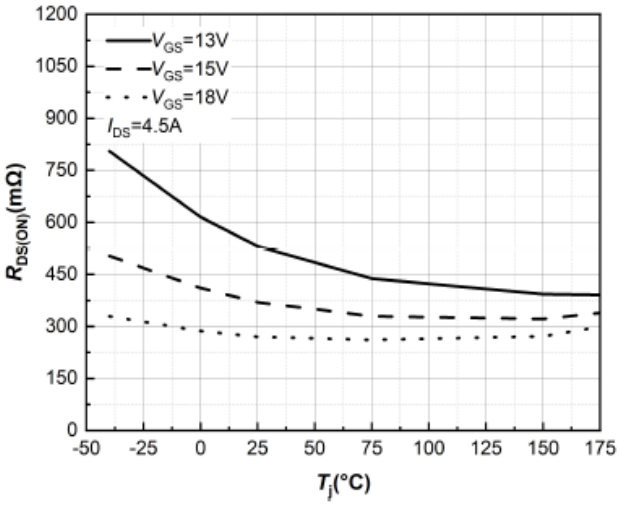


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

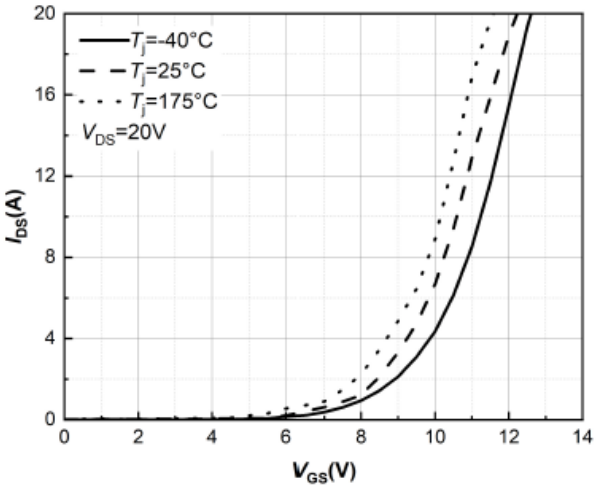


Figure 7. Transfer Characteristic for Various Junction Temperatures

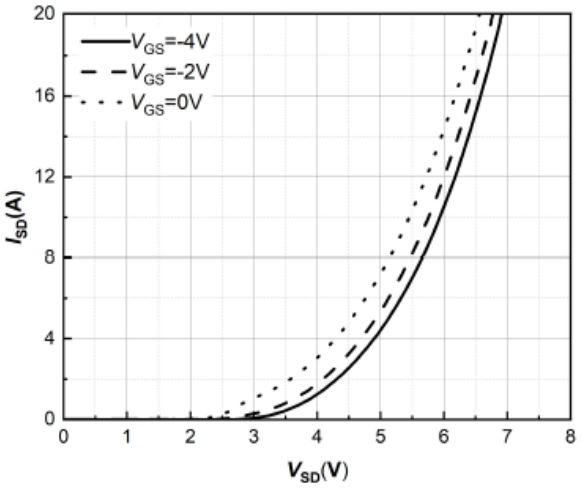


Figure 8. Body Diode Characteristic T_J=-40°C

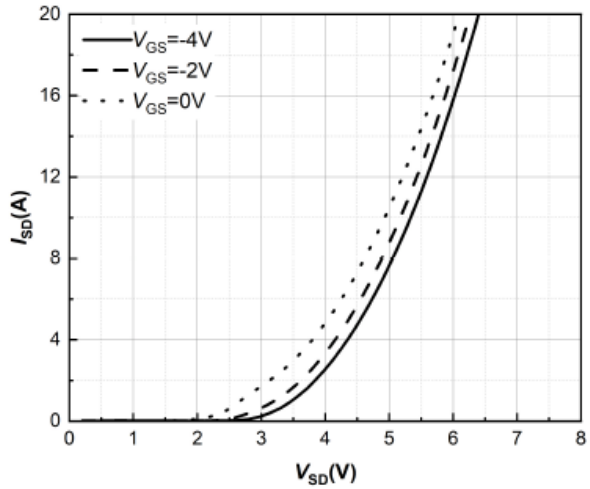


Figure 9. Body Diode Characteristic T_J=25°C

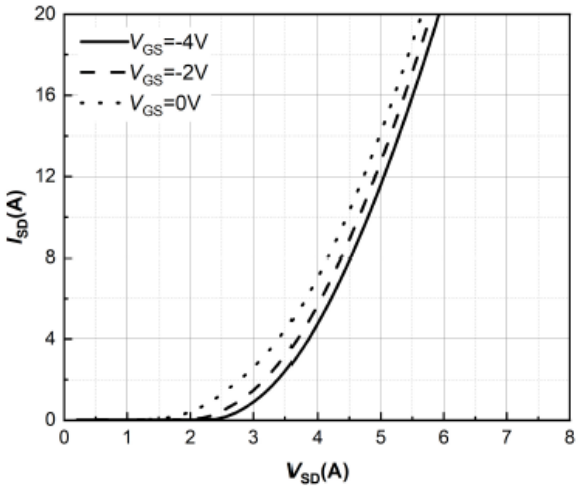


Figure 10. Body Diode Characteristics T_J=175°C

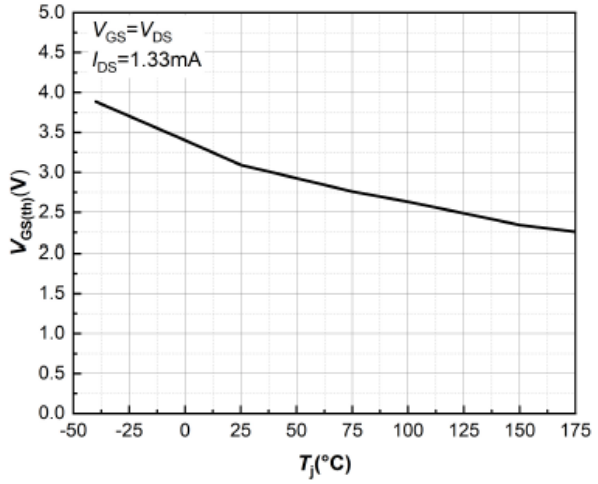


Figure 11. Threshold Voltage vs. Temperature

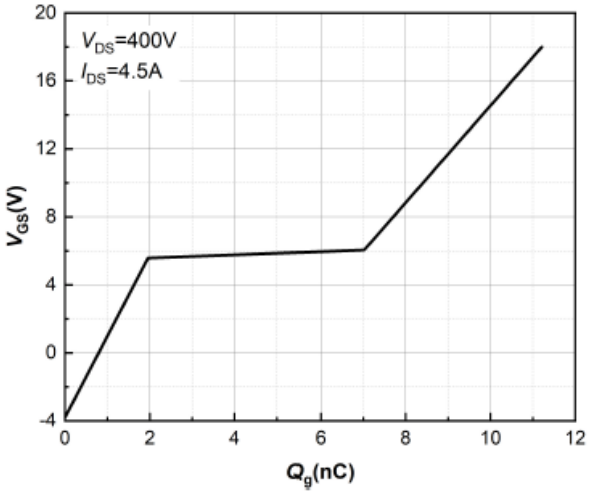


Figure 12. Gate Charge Characteristics

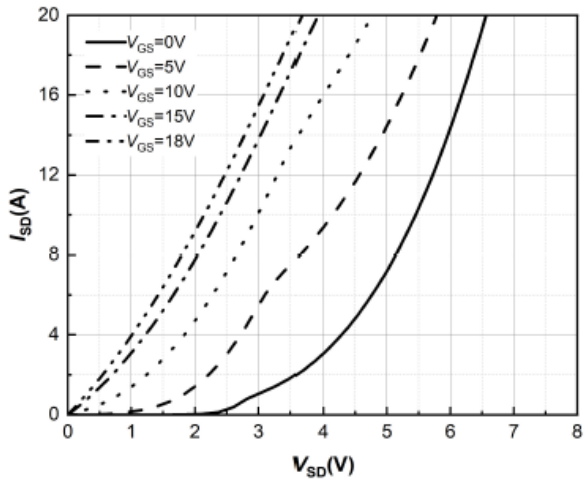


Figure 13. 3rd Quadrant Characteristic
T_J=-40°C

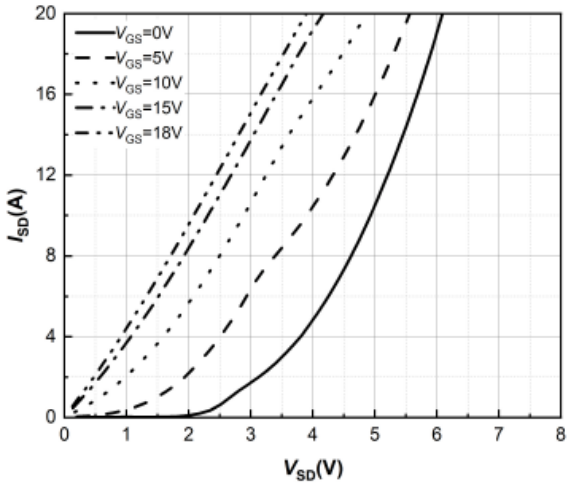


Figure 14. 3rd Quadrant Characteristic
T_J=25°C

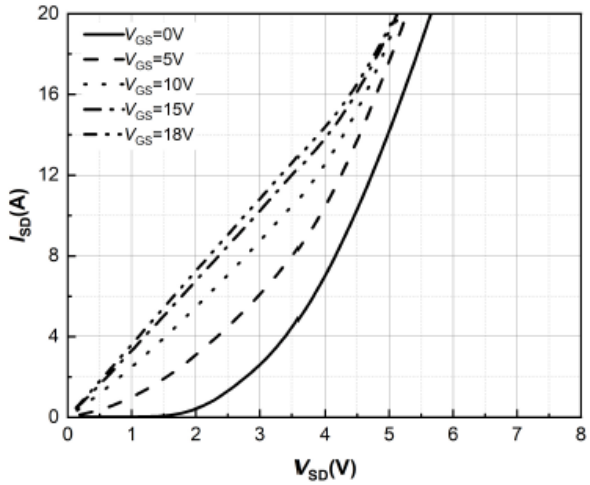


Figure 15. 3rd Quadrant Characteristic
T_J=175°C

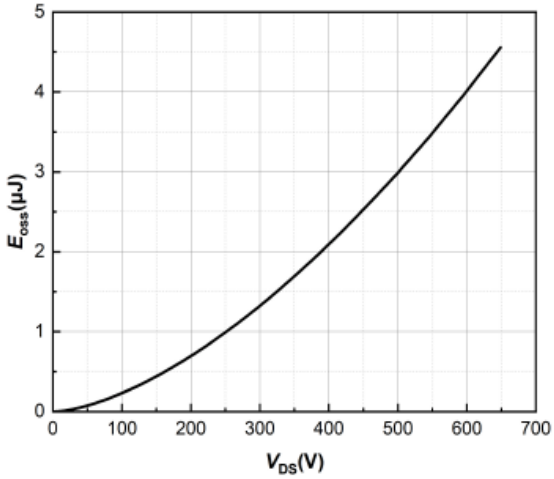


Figure 16. Output Capacitor Stored Energy

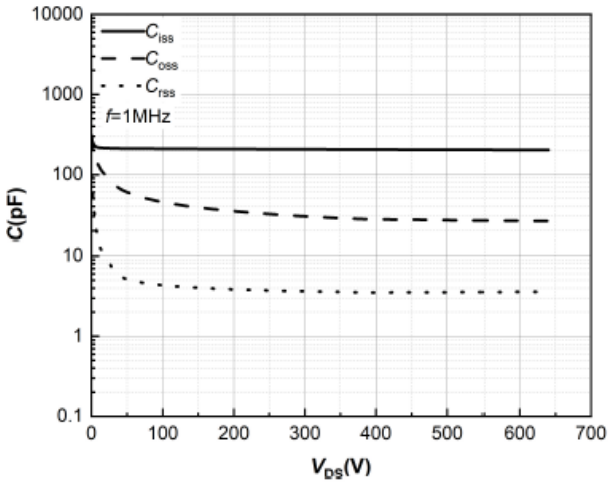


Figure 17. Capacitances vs. Drain-Source

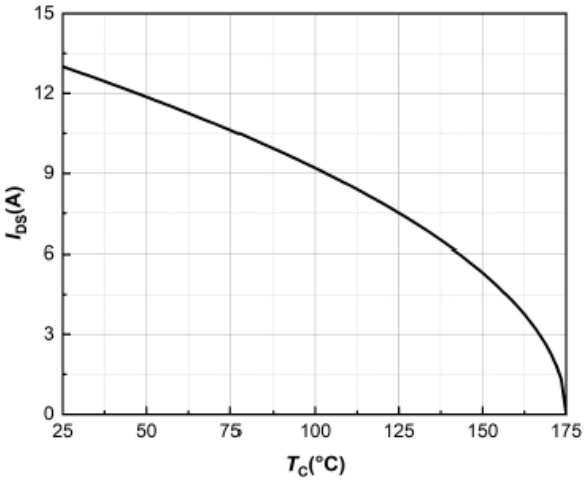


Figure 18. Continuous Drain Current
Derating vs. Case Temperature

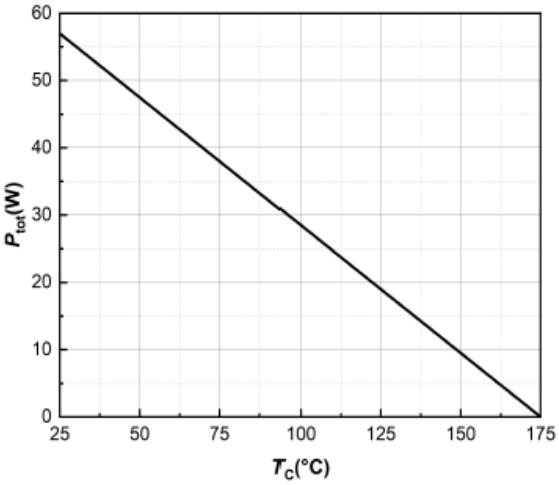


Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

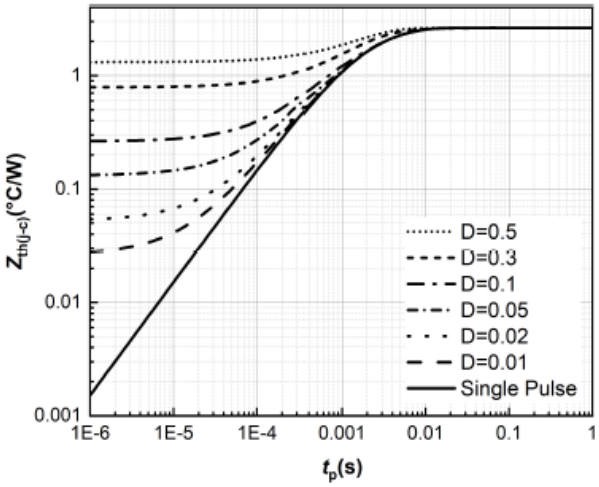


Figure 20. Transient Thermal Impedance

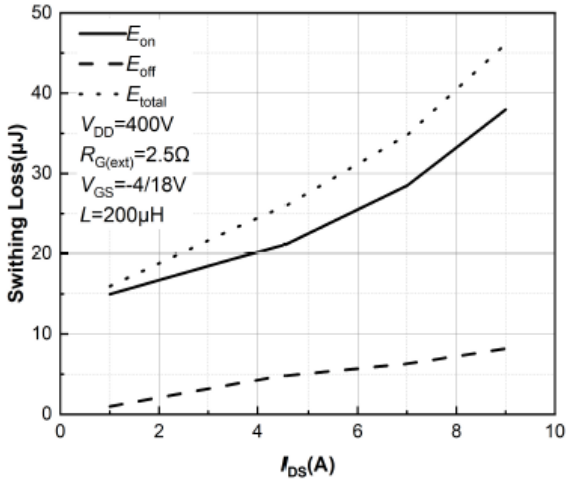


Figure 21. Clamped Inductive Switching Energy vs. Drain Current

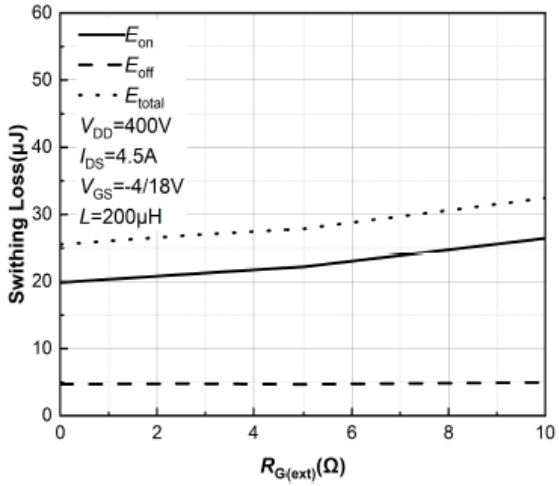


Figure 22. Clamped Inductive Switching Energy vs. R_G

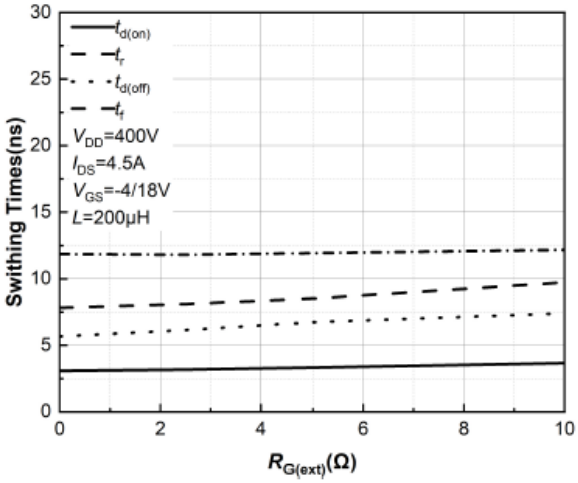


Figure 23. Switching Times vs. R_G

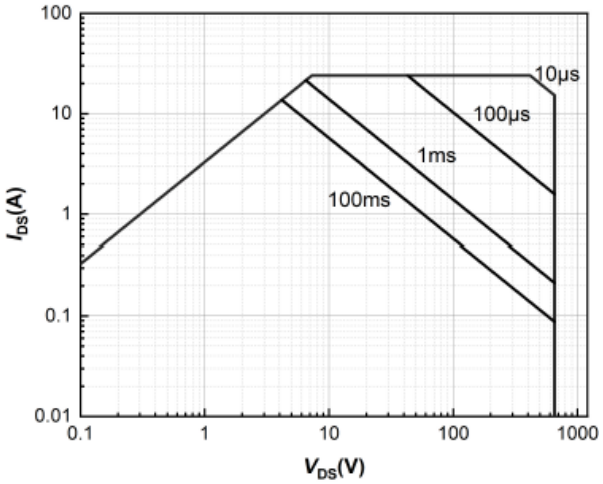
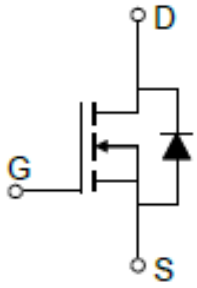
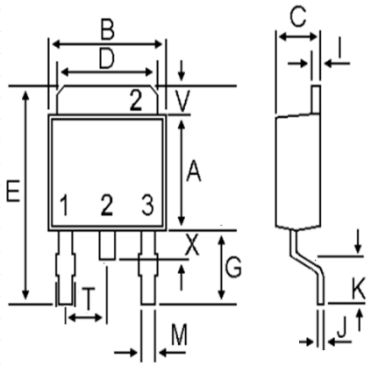


Figure 24. Safe Operating Area

·Circuit diagram



·Package outlines : Dimensions in (mm)



DIM	MILLIMETERS	
	MIN	MAX
A	5.97	6.22
B	6.30	6.75
C	2.18	2.40
D	4.95	5.50
E	9.40	10.41
G	2.75	3.20
I	0.46	0.89
J	0.46	0.61
K	1.40	1.78
M	0.64	0.89
T	2.18	2.38
V	0.89	1.27
X	---	1.05

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