

Description

Product Summary

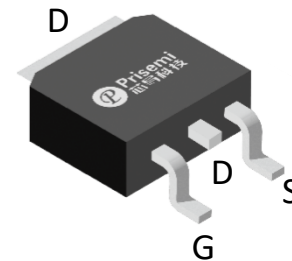
$V_{DS}(V)$	$R_{DS(on)}(m\Omega)$	$I_D(A)$
650	360@ $V_{GS}=15V$	13

Feature

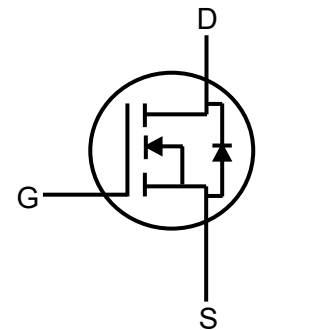
- High Speed Switching
- High Blocking Voltage with Low $R_{DS(on)}$
- Easy to Parallel
- Simple to Drive
- RoHS Compliant

Applications

- Power Factor Correction Modules
- Switch Mode Power Supplies
- DC-AC Inverters
- High Voltage DC/DC Converters



TO-252 (Bottom View)



Schematic diagram

Absolute maximum rating@25°C

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DS}	650	V
Gate-Source Voltage (Absolute maximum values)		V_{GSmax}	-8/+22	V
Gate-Source Voltage (Recommended operational values)		V_{GSop}	-4/+18	V
Continuous Drain Current	$T_C=25^\circ C$	I_D	13	A
	$T_C=100^\circ C$		9.2	
Pulsed drain current (TC = 25°C, tp limited by Tjmax)		$I_{D\ pulse}$	24	A
Power dissipation	$T_C=25^\circ C$	P_{tot}	57	W
	$T_C=100^\circ C$		28.5	
Operating Junction Temperature		T_J	-40 to +175	°C
Storage Temperature		T_{STG}	-40 to +175	°C

Thermal Resistance

Parameter	Symbol	Min	Typ	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	-	2.63	-	°C/W

Electrical characteristics per line@25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units	
Statistic Characteristics							
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 100μA	650	-	-	V	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 650V, V _{GS} = 0V	-	1	-	μA	
Gate-Body Leakage Current	I _{GSS}	V _{GS} = 18V, V _{DS} = 0V	-	-	250	nA	
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 1.33mA	2.0	3.1	4.0	V	
		T _j =175°C	-	2.2	-		
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} = 15V, I _D = 4.5A	T _j =25°C	-	370	500	mΩ
			T _j =175°C	-	340	-	
		V _{GS} = 18V, I _D = 4.5A	T _j =25°C	-	270	357	
			T _j =175°C	-	298	-	
Dynamic Characteristics							
Input Capacitance	C _{iss}	V _{DS} = 600V, f=1MHz, V _{GS} =0V	-	203	-	pF	
Output Capacitance	C _{oss}		-	26	-		
Reverse Transfer Capacitance	C _{rss}		-	3.5	-		
Turn-on Delay Time	t _{d(on)}	V _{GS} =-4/+18V, I _D =4.5A, V _{DS} =400V, Rg=2.5Ω, L=200μH	-	3	-	ns	
Turn-on Rise Time	t _r		-	8	-		
Turn-Off Delay Time	t _{d(off)}		-	6	-		
Turn-Off Fall Time	t _f		-	11	-		
Turn-On Energy (Body Diode)	E _{on}		-	21	-	mJ	
Turn-Off Energy (Body Diode)	E _{off}		-	5	-		
Total Gate Charge	Q _g		V _{GS} =-4/+18V, V _{DS} =400V, I _D =4.5A	-	11.2	-	nC
Gate-Source Charge	Q _{gs}	-		2	-		
Gate-Drain Charge	Q _{gd}	-		5.2	-		
Gate Resistance	R _G	V _{AC} =25mV, f=1MHz	-	3.6	-	Ω	

Electrical characteristics per line@25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Reverse Diode Characteristics						
Body Diode Forward Voltage	V_{SD}	$V_{GS}=-4V, I_{SD}=2.5A, T_J=25^{\circ}C$	-	4.0	-	V
		$V_{GS}=-4V, I_{SD}=2.5A, T_J=175^{\circ}C$	-	3.6	-	
		$V_{GS}=-4V, I_{SD}=4.5A, T_J=25^{\circ}C$	-	4.5	-	
		$V_{GS}=-4V, I_{SD}=4.5A, T_J=175^{\circ}C$	-	4.0	-	
Continuous Diode Forward Current	I_S	$V_{GS}=-4V, T_C=25^{\circ}C$	-	13	-	A
		$V_{GS}=-4V, T_C=100^{\circ}C$	-	6.5	-	
Body Diode Reverse Recovery Time	t_{rr}	$V_{GS}=-4V, I_{SD}=4.5A, V_R=400V, di/dt=1000A/\mu s$	-	10	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	56	-	nC
Peak Reverse Recovery Current	I_{rrm}		-	4	-	A

Typical Characteristics

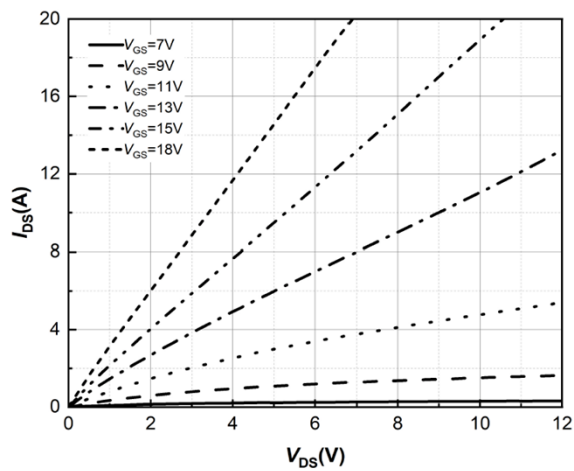
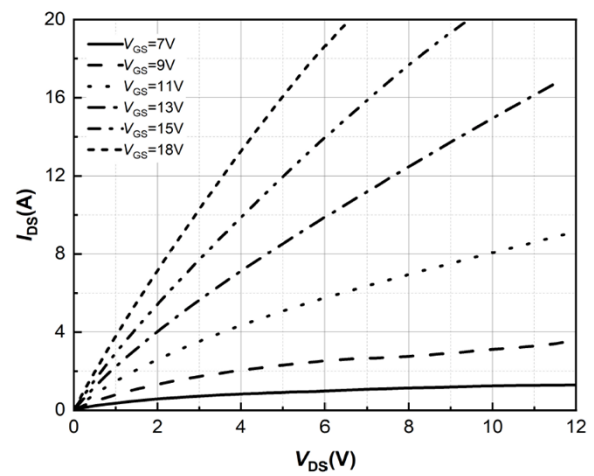
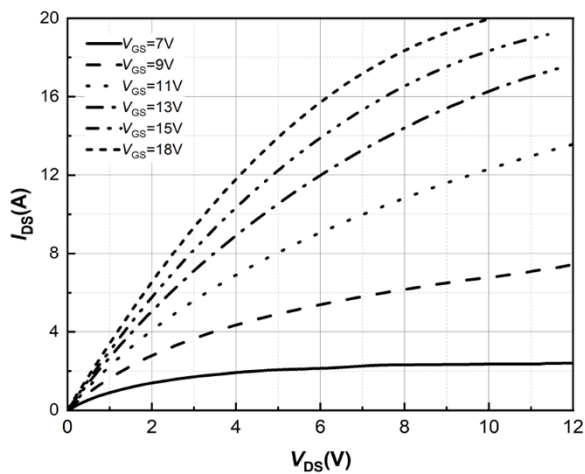
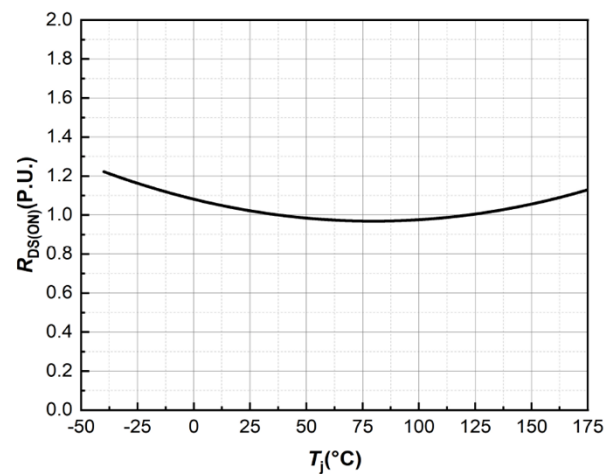
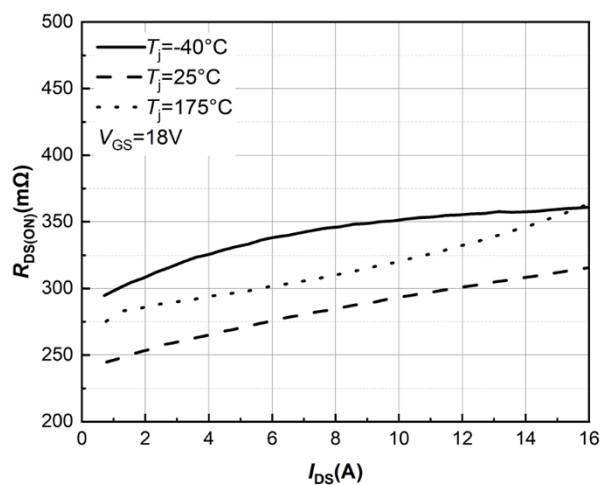
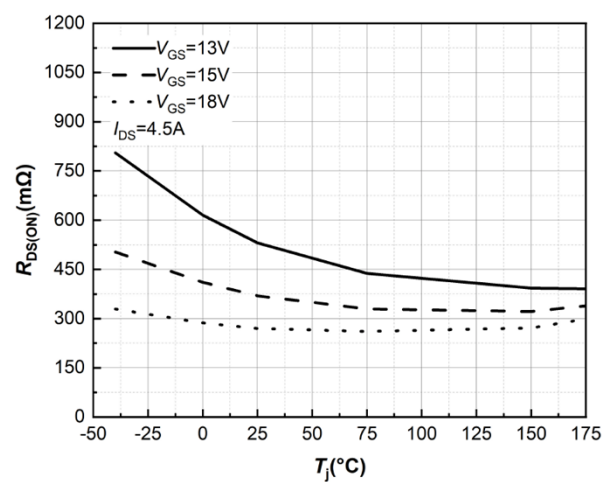
Figure 1. Output Characteristics
 $T_j = -40^\circ\text{C}$ 

Figure 2 Output Characteristics

Figure 3. Output Characteristics
 $T_j = 175^\circ\text{C}$ Figure 4. Normalized On-Resistance vs.
TemperatureFigure 5. On-Resistance vs. Drain Current
For Various TemperaturesFigure 6. On-Resistance vs. Temperature
For Various Gate Voltage

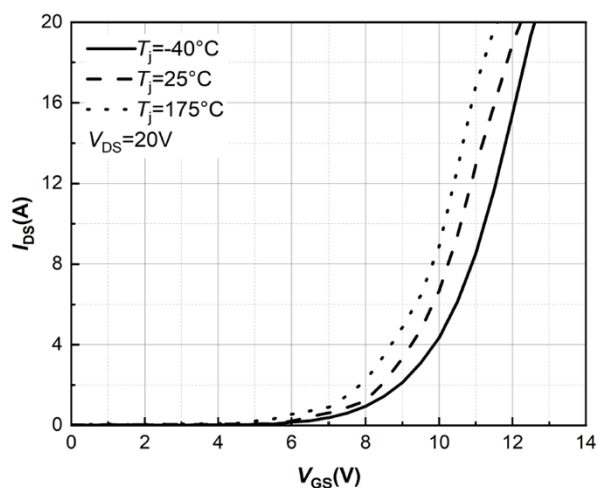


Figure 7. Transfer Characteristic for Various Junction Temperatures

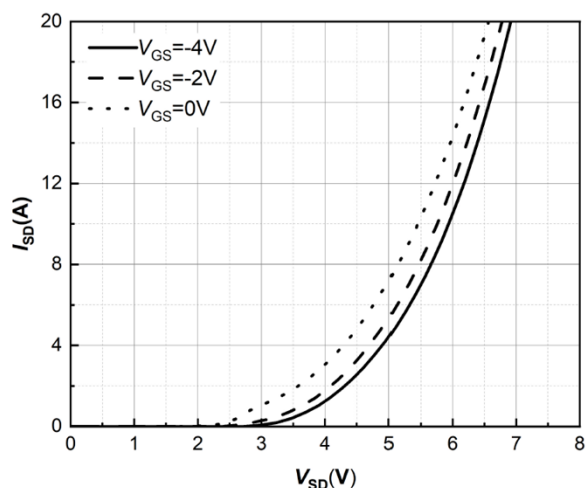


Figure 8. Body Diode Characteristic $T_J = -40^\circ\text{C}$

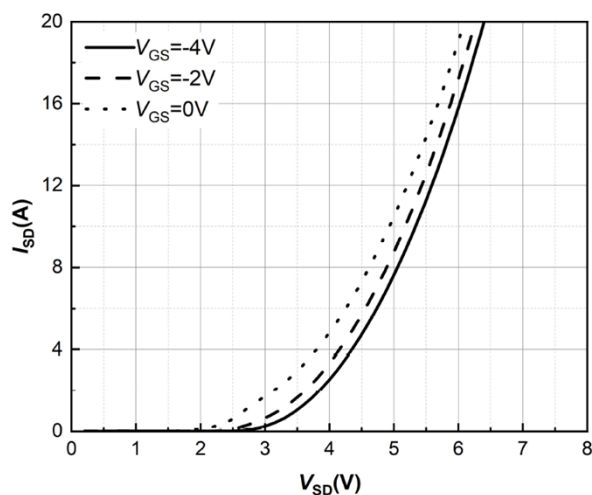


Figure 9. Body Diode Characteristic $T_J = 25^\circ\text{C}$

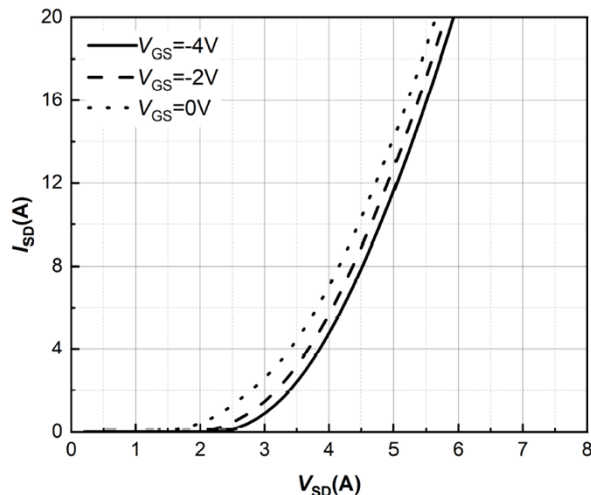


Figure 10. Body Diode Characteristic $T_J = 175^\circ\text{C}$

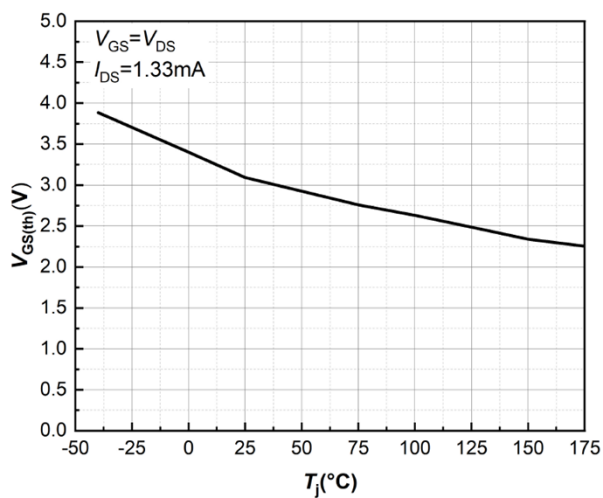


Figure 11. Threshold Voltage vs. Temperature

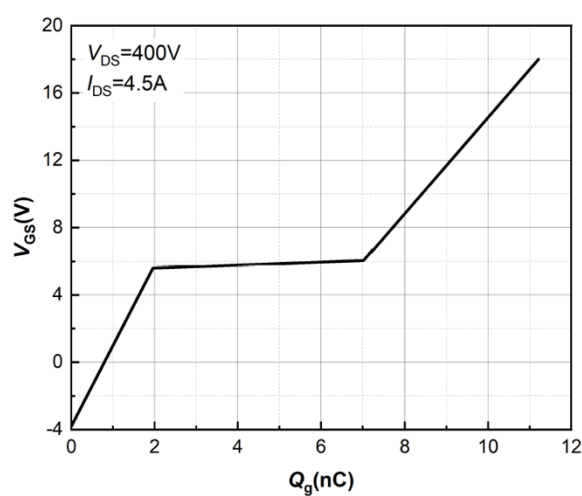


Figure 12. Gate Charge Characteristics

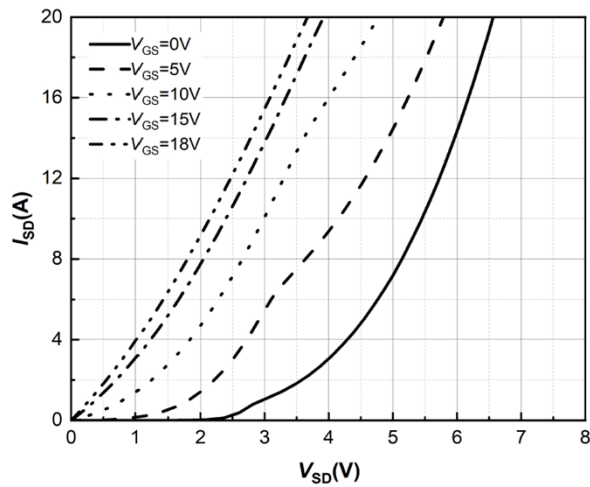


Figure 13. 3rd Quadrant Characteristic
 $T_j = -40^\circ\text{C}$

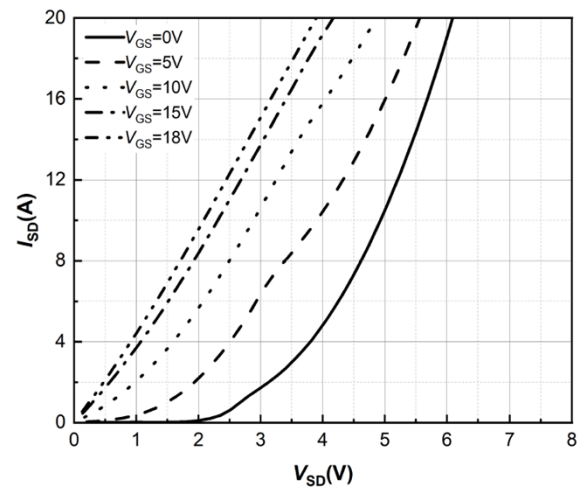


Figure 14. 3rd Quadrant Characteristic
 $T_j = 25^\circ\text{C}$

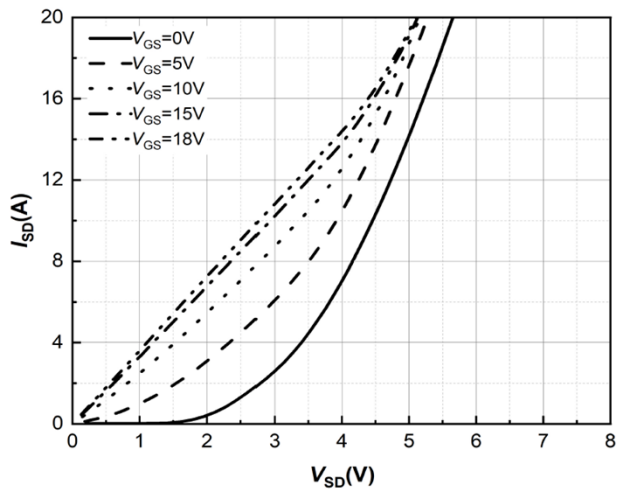


Figure 15. 3rd Quadrant Characteristic
 $T_j = 175^\circ\text{C}$

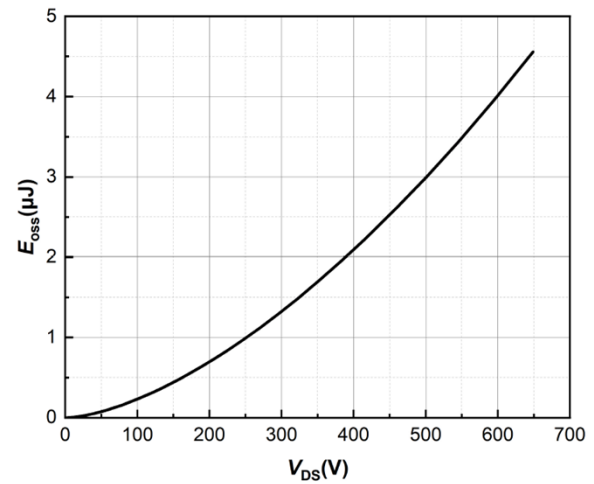


Figure 16. Output Capacitor Stored Energy

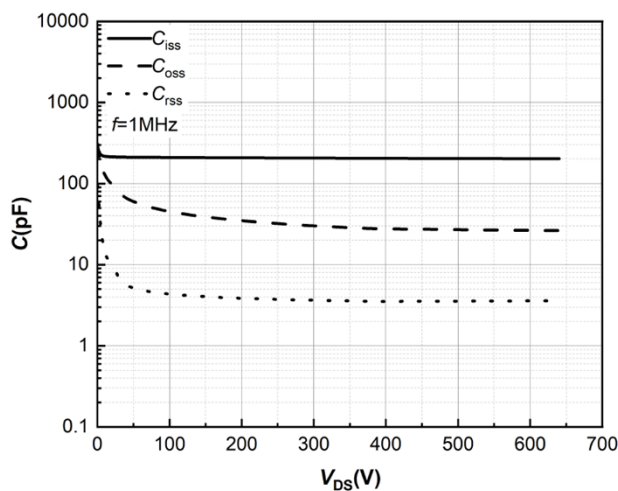


Figure 17. Capacitances vs. Drain-Source

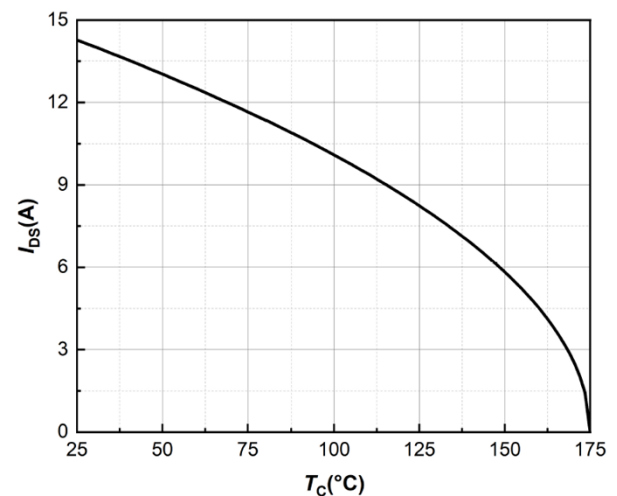


Figure 18. Continuous Drain Current
Derating vs. Case Temperature

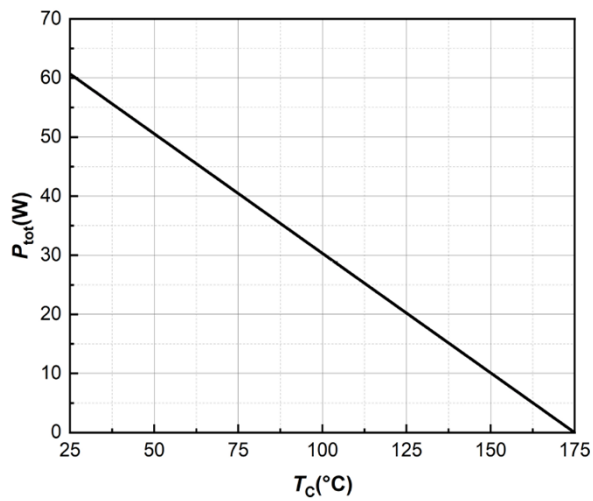


Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

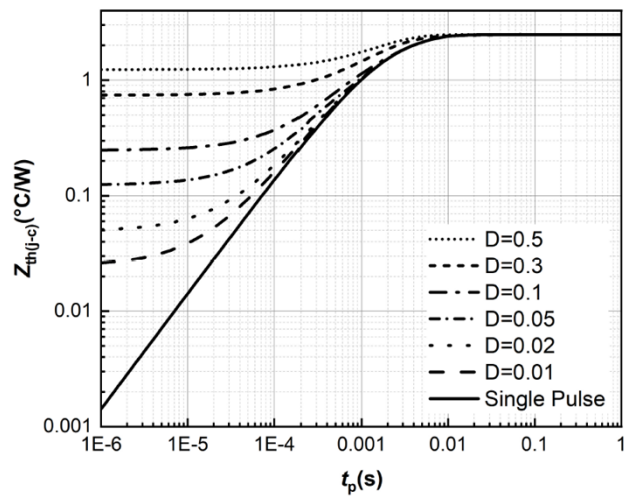


Figure 20. Transient Thermal Impedance

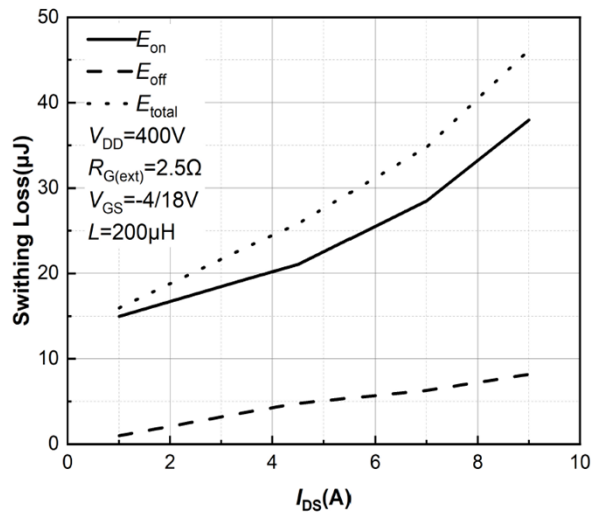


Figure 21. Clamped Inductive Switching Energy vs. Drain Current

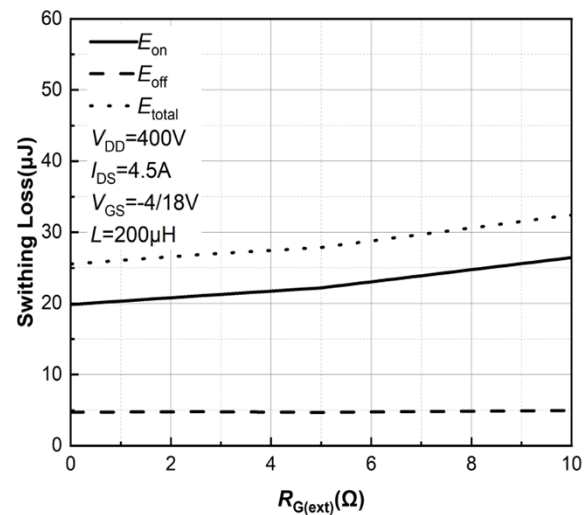


Figure 22. Clamped Inductive Switching Energy vs. R_G

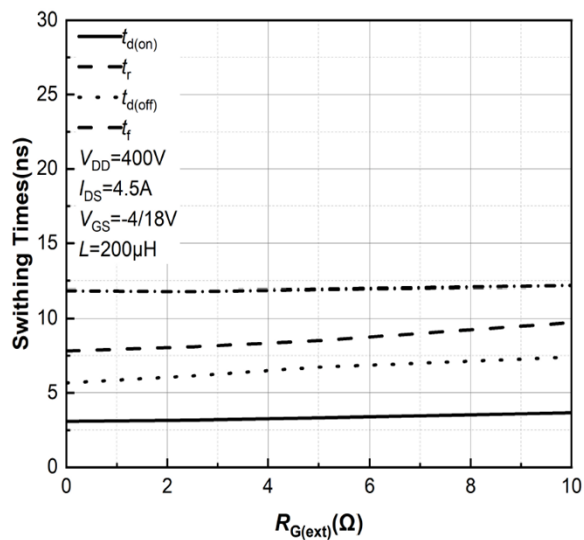


Figure 23. Switching Times vs. R_G

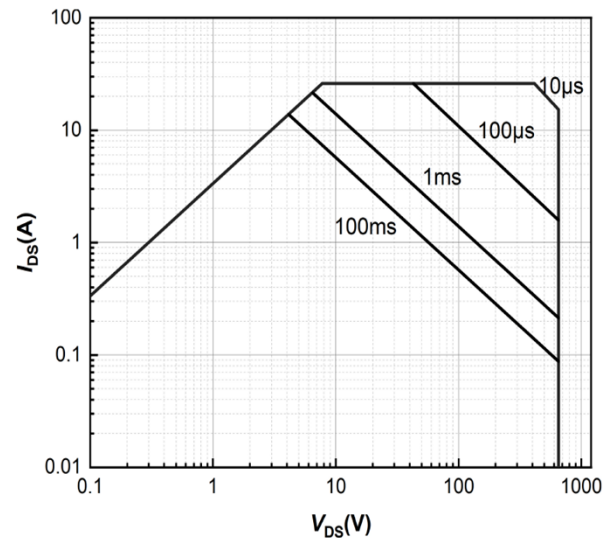
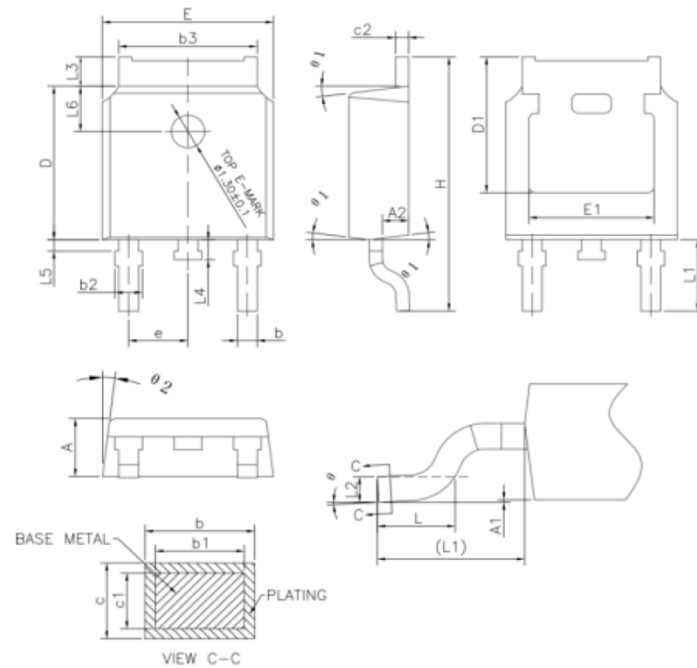


Figure 24. Safe Operating Area

Product Dimension (TO-252)



SYMBOL	Millimeter		
	Min	Nom	Max
A	2.20	2.30	2.38
A1	0	-	0.10
A2	0.90	1.01	1.10
b	0.72	-	0.85
b1	0.71	0.76	0.81
b2	0.72	-	0.90
b3	5.13	5.33	5.46
c	0.47	-	0.60
c1	0.46	0.51	0.56
c2	0.47	-	0.60
D	6.00	6.10	6.20
D1	5.25	-	-
E	6.50	6.60	6.70
E1	4.70	-	-
e	2.186	2.286	2.386
H	9.80	10.10	10.40
L	1.40	1.50	1.70
L1	2.90 REF		
L2	0.50 BSC		
L3	0.90	-	1.25
L4	0.60	0.80	1.00
L5	0.15	-	0.75
L6	1.80 REF		
θ	0°	-	8°
θ1	5°	7°	9°
θ2	5°	7°	9°

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