



### Features

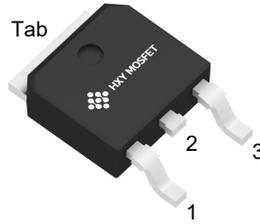
- High Speed Switching with Low Capacitances
- High Blocking Voltage with Low  $R_{DS(on)}$
- Easy to parallel
- Simple to drive
- RoHS Compliant

### Benefits

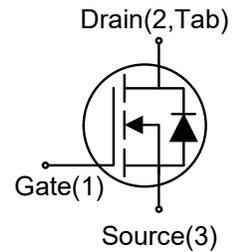
- Increased Power Density
- Faster Operating Frequency
- Reduction of Heat Sink Requirements
- Higher Efficiency
- Reduced EMI

### Applications

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



TO-252-2L



Ordering Part Number	Package	Brand
XP65SL380DH	TO-252-2L	HXY MOSFET

### Maximum Ratings (T<sub>c</sub> = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V <sub>DSmax</sub>	Drain - Source Voltage	650	V	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 100 μA	
V <sub>GSmax</sub>	Gate - Source Voltage (dynamic)	-8/+22	V	AC (f > 1 Hz)	Note 1
V <sub>GSop</sub>	Gate - Source Voltage (static)	-4/+18	V	Static	Note 2
I <sub>D</sub>	Continuous Drain Current	13	A	T <sub>C</sub> = 25°C	Fig. 19 Note 3
		9.2		T <sub>C</sub> = 100°C	
I <sub>D(pulse)</sub>	Pulsed Drain Current	24	A	Pulse width t <sub>p</sub> limited by T <sub>Jmax</sub>	
P <sub>D</sub>	Power Dissipation	57	W	T <sub>C</sub> = 25°C	Fig. 20
		28.5		T <sub>C</sub> = 100°C	
T <sub>J</sub> , T <sub>stg</sub>	Operating Junction and Storage Temperature	-40 to +175	°C		



**Electrical Characteristics** ( $T_c = 25^\circ\text{C}$  unless otherwise specified)

**Static Characteristics**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D=100\mu\text{A}$ , $V_{GS}=0\text{V}$	650			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=650\text{V}$ , $V_{GS}=0\text{V}$		1		$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{DS}=0\text{V}$ , $V_{GS}=18\text{V}$			250	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$ , $I_D=1.33\text{mA}$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$	2	3.1 2.3	4	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=18\text{V}$ , $I_D=4.5\text{A}$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$		270 298		$\text{m}\Omega$

**Thermal Characteristics**

Symbol	Parameter	Value			Unit
		Min.	Typ.	Max.	
$R_{th(j-c)}$	Thermal Resistance from Junction to Case		2.63		$^\circ\text{C/W}$

**Dynamic Characteristics**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$C_{iss}$	Input Capacitance	$V_{DS}=600\text{V}$ , $f=1\text{MHz}$ , $V_{GS}=0\text{V}$		203		$\text{pF}$
$C_{oss}$	Output Capacitance			26		$\text{pF}$
$C_{rss}$	Reverse Transfer Capacitance			3.5		$\text{pF}$
$R_{G(int)}$	Internal Gate Resistance	$f=1\text{MHz}$		3.6		$\Omega$
$Q_g$	Total Gate Charge	$V_{DS}=400\text{V}$ , $I_D=4.5\text{A}$ , $V_{GS}=-4/18\text{V}$		11.2		nC
$Q_{gs}$	Gate to Source Charge			2		nC
$Q_{gd}$	Gate to Drain Charge			5.2		nC



### Switching Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=400V, I_D=4.5A,$ $V_{GS}=-4V/18V,$ $R_G=2.5\Omega,$ $L=200\mu H$		5		ns
$t_r$	Rise Time			23		ns
$t_{d(off)}$	Turn-Off Delay Time			6		ns
$t_f$	Fall Time			8		ns
$E_{on}$	Turn-On Energy			34		$\mu J$
$E_{off}$	Turn-Off Energy			4		$\mu J$

### Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{SD}$	Diode Forward Voltage	$V_{GS}=-4V, I_{SD}=2.5A$ $T_j=25^\circ C$ $T_j=175^\circ C$		4.0		V
				3.6		
		$V_{GS}=-4V, I_{SD}=4.5A$ $T_j=25^\circ C$ $T_j=175^\circ C$		4.5		
				4.0		
$I_S$	Continuous Diode Forward Current	$V_{GS}=-4V$ $T_c=25^\circ C$ $T_c=100^\circ C$		13 6.5		A
$t_{rr}$	Reverse Recovery Time	$V_{GS}=-4V, I_{SD}=4.5A,$ $V_R=400V,$ $di/dt=1000A/\mu s$		22		ns
$Q_{rr}$	Reverse Recovery Charge			68		nC
$I_{rrm}$	Peak Reverse Recovery Current			4		A



### Typical Performance

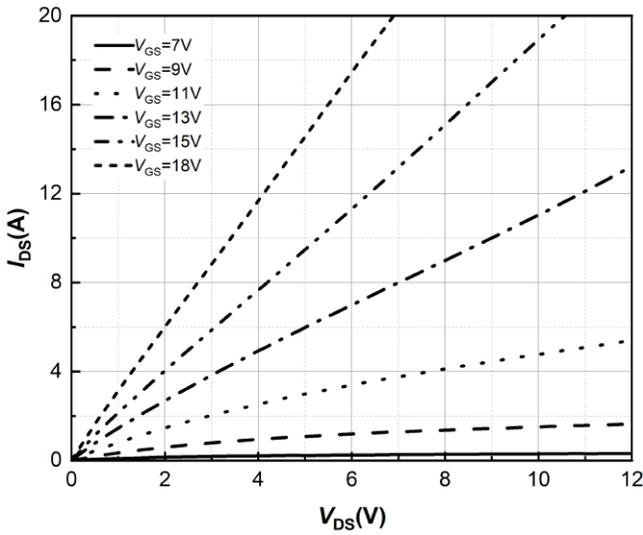


Figure 1. Output Characteristics  
 $T_j = -40^\circ\text{C}$

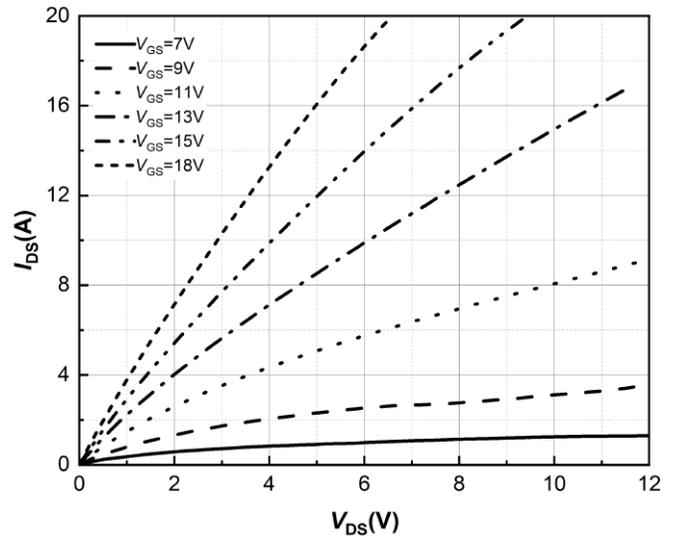


Figure 2 Output Characteristics

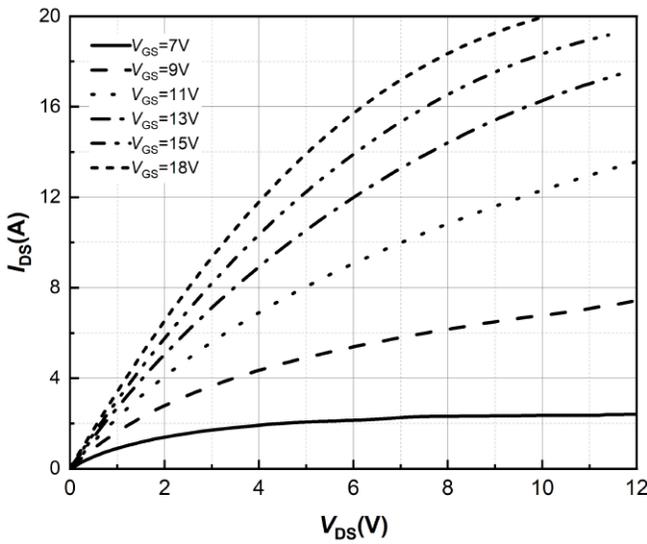


Figure 3. Output Characteristics  
 $T_j = 175^\circ\text{C}$

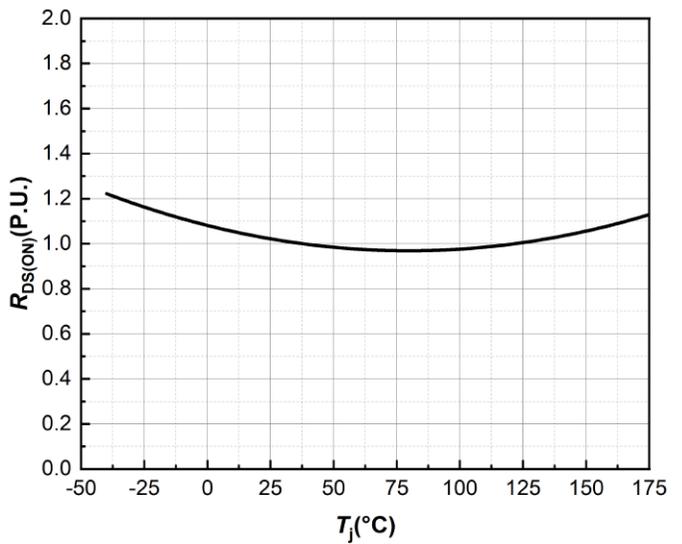


Figure 4. Normalized On-Resistance vs. Temperature

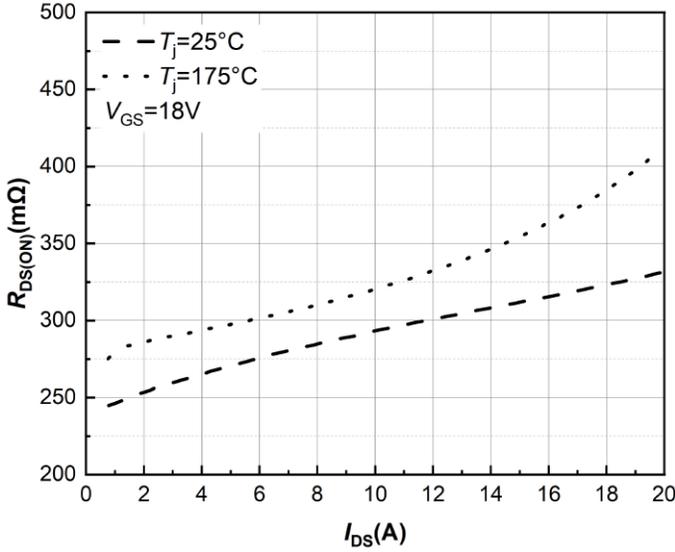


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

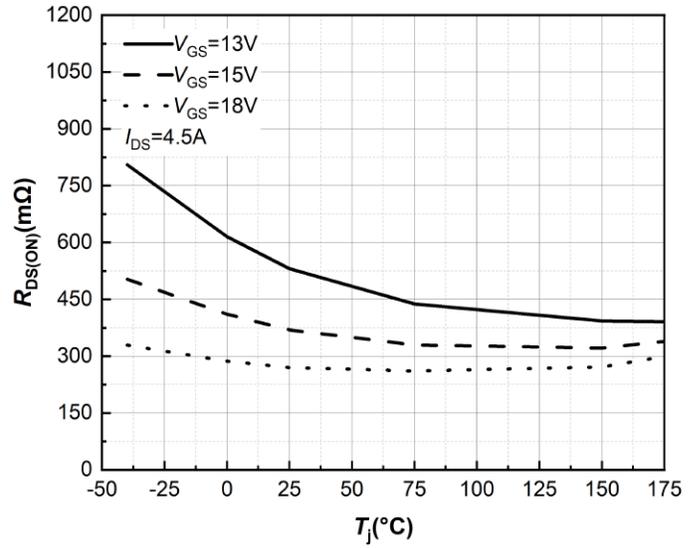


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

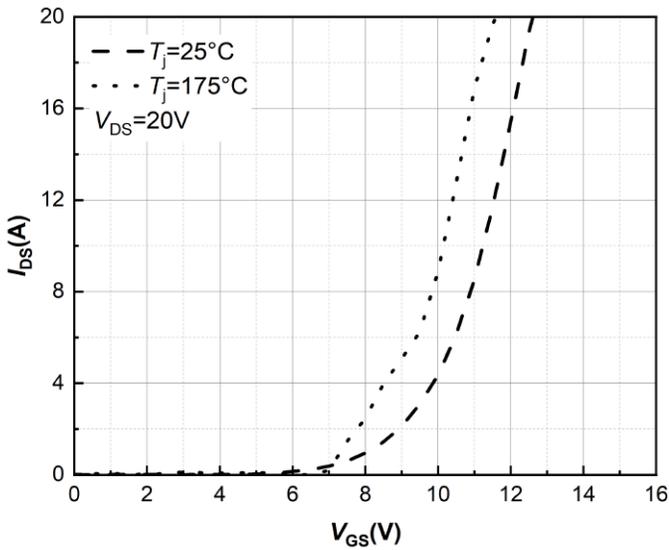


Figure 7. Transfer Characteristic for Various Junction Temperatures

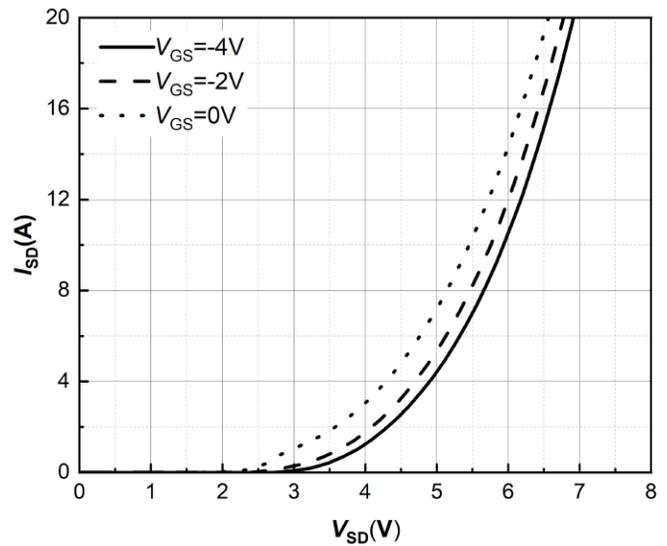


Figure 8. Body Diode Characteristic  $T_j = -40^\circ\text{C}$

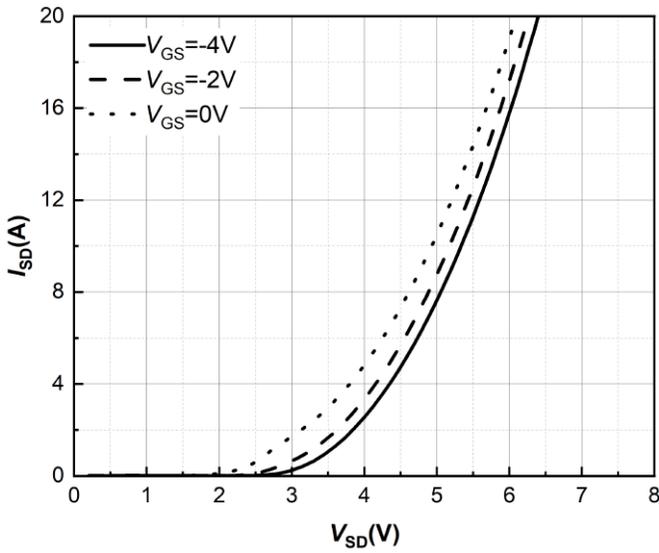


Figure 9. Body Diode Characteristic  
 $T_j=25^{\circ}\text{C}$

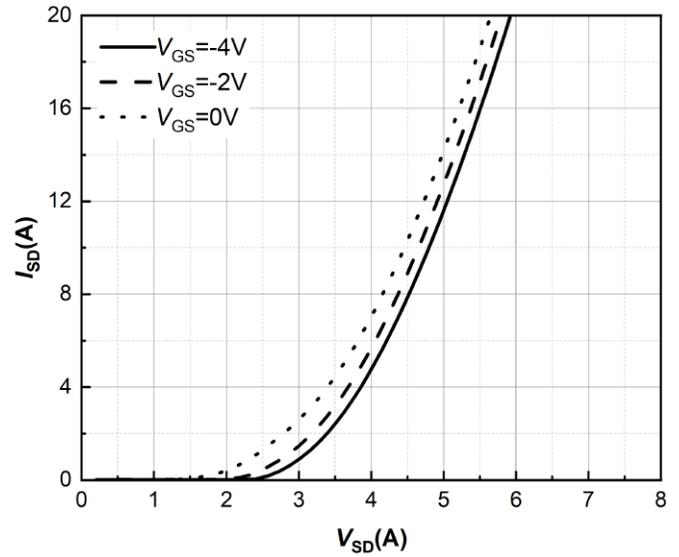


Figure 10. Body Diode Characteristic  
 $T_j=175^{\circ}\text{C}$

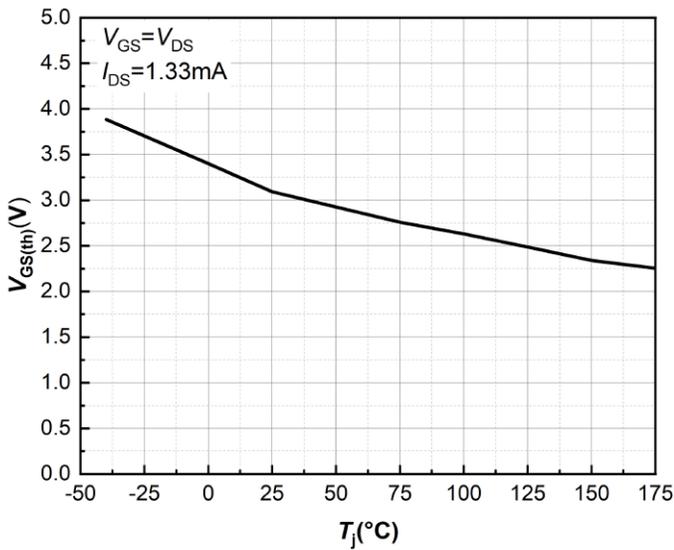


Figure 11. Threshold Voltage vs. Temperature

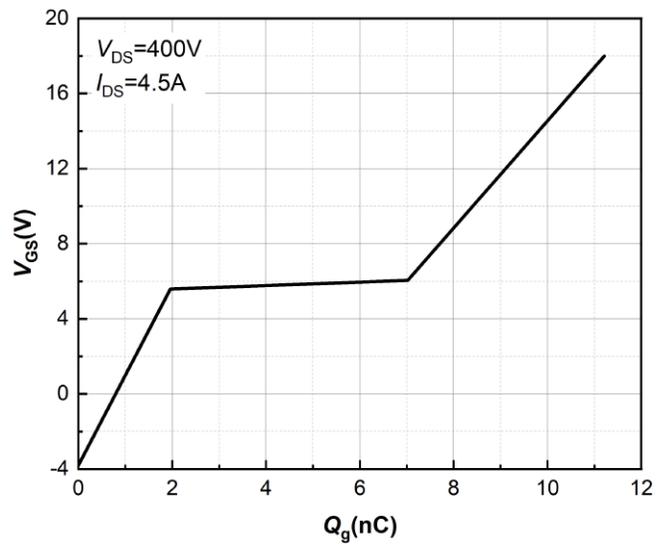


Figure 12. Gate Charge Characteristics

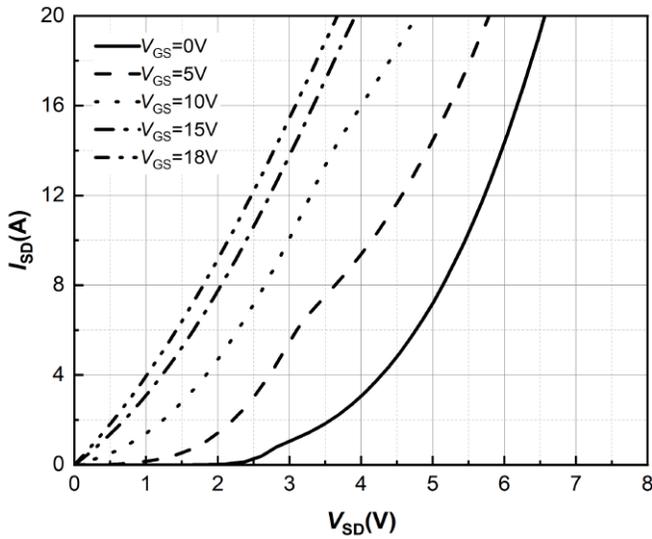


Figure 13. 3rd Quadrant Characteristic  
 $T_j = -40^\circ\text{C}$

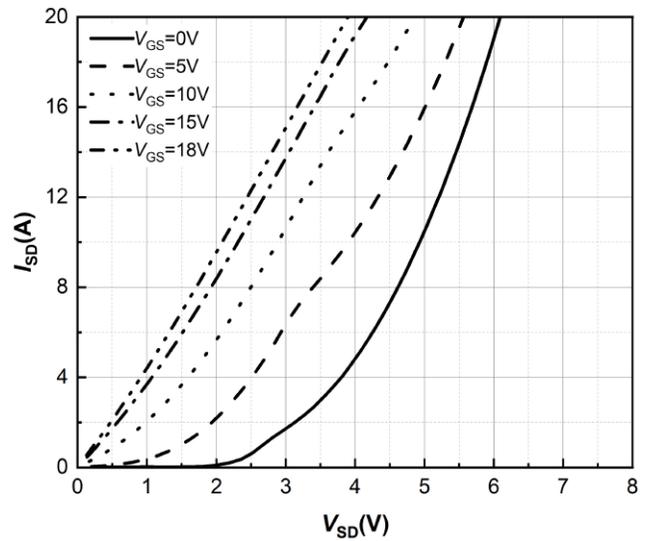


Figure 14. 3rd Quadrant Characteristic  
 $T_j = 25^\circ\text{C}$

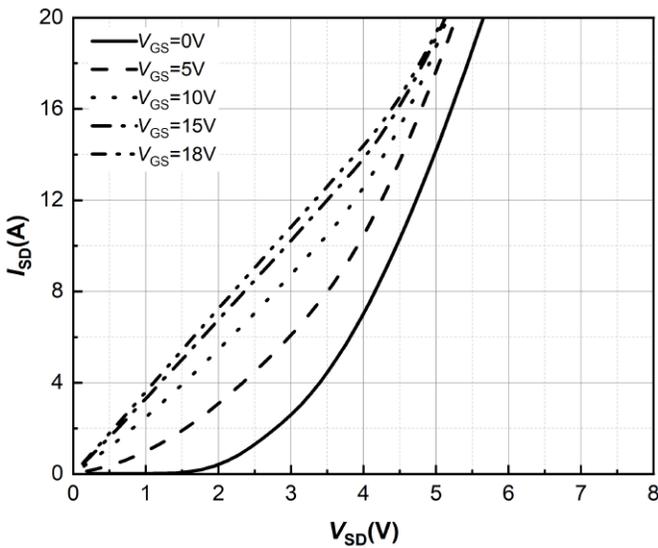


Figure 15. 3rd Quadrant Characteristic  
 $T_j = 175^\circ\text{C}$

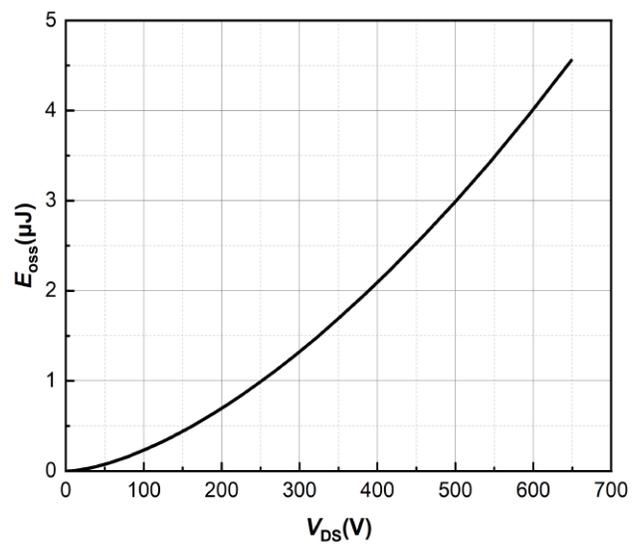


Figure 16. Output Capacitor Stored Energy

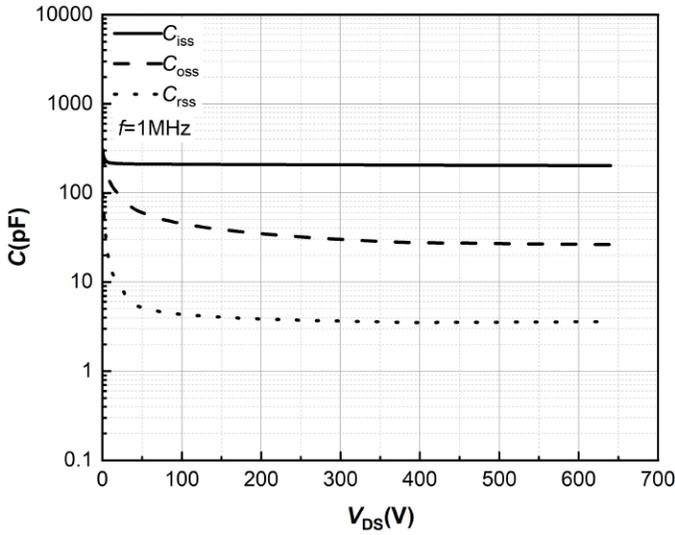


Figure 17. Capacitances vs. Drain-Source

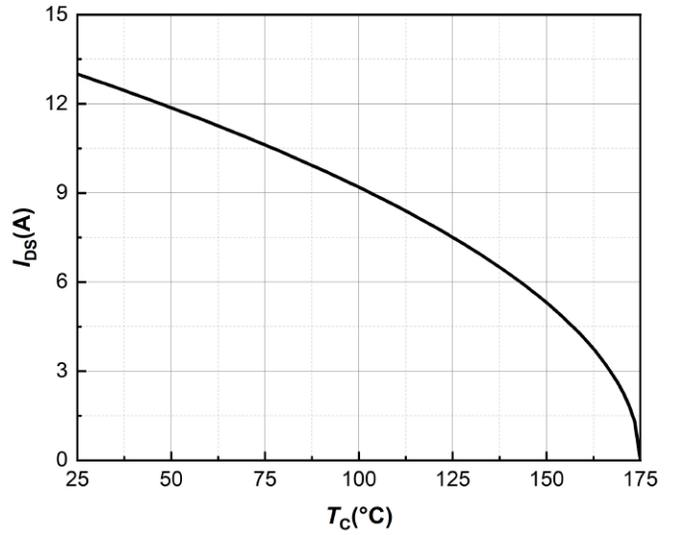


Figure 18. Continuous Drain Current Derating vs. Case Temperature

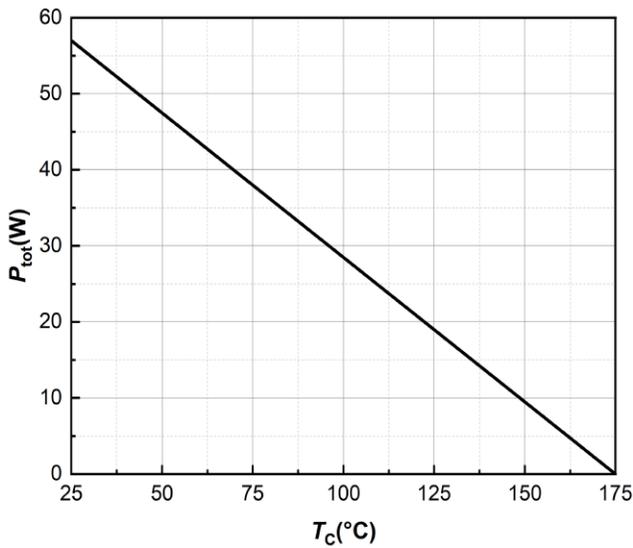


Figure 19. Maximum Power Dissipation Derating vs. Case Temperature

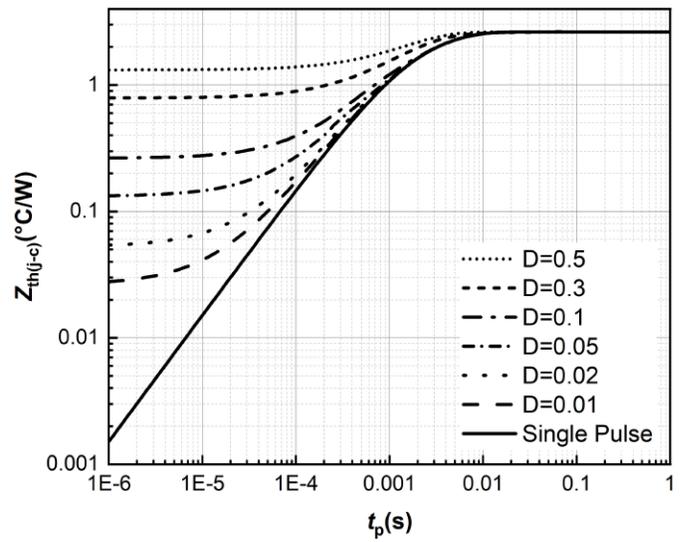


Figure 20. Transient Thermal Impedance

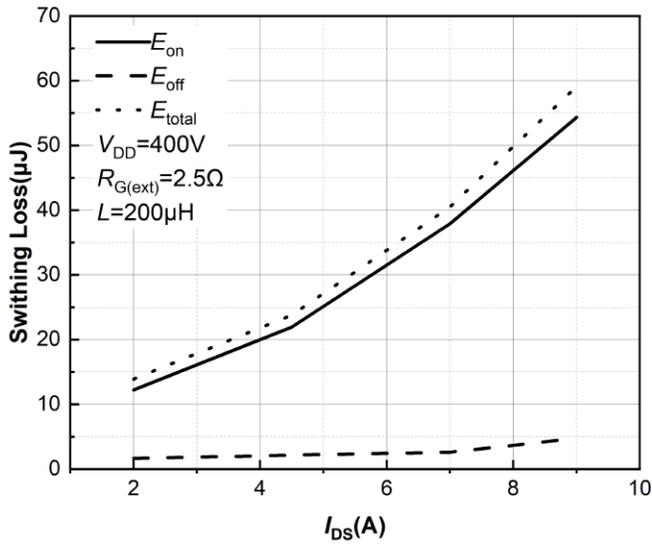


Figure 21. Clamped Inductive Switching Energy vs. Drain Current

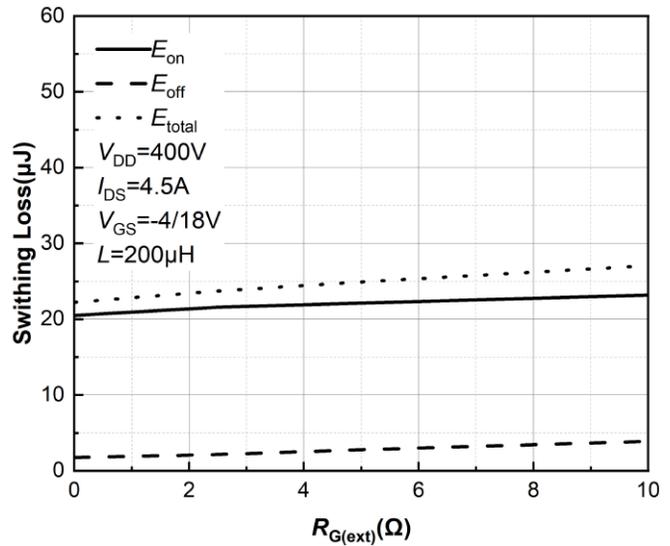


Figure 22. Clamped Inductive Switching Energy vs.  $R_G$

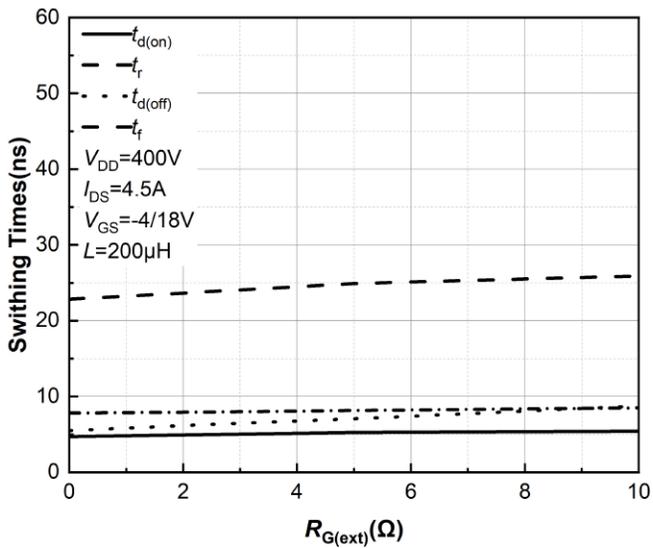


Figure 23. Switching Times vs.  $R_G$

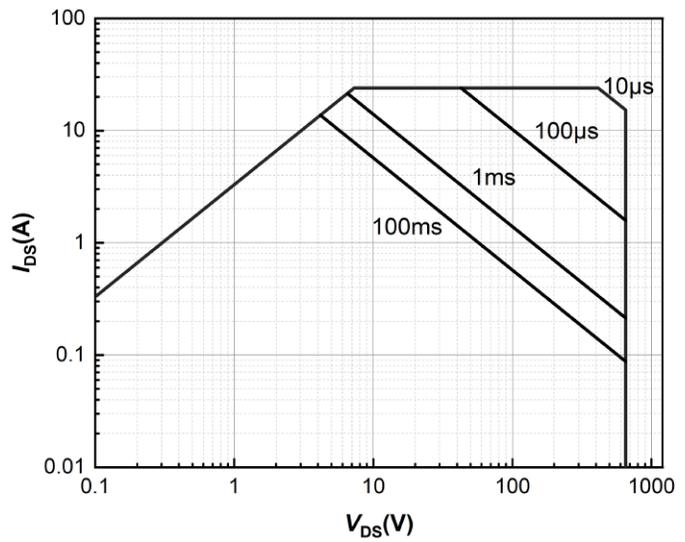
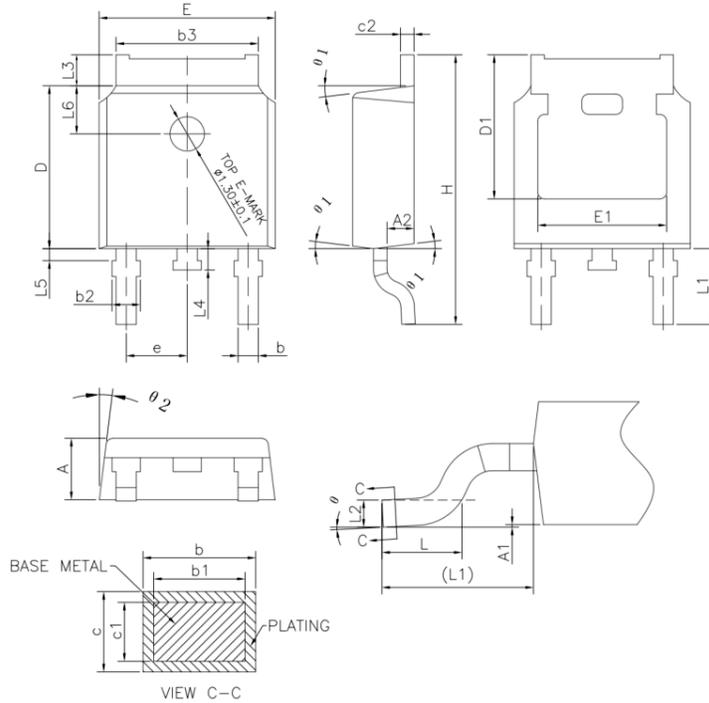


Figure 24. Safe Operating Area



## Package Dimensions

Package TO-252-2L



SYMBOL	Unit: mm		
	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	0.508 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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