

**Features**

- SiC MOSFET Technology
- High Speed Switching
- Reduction Of Heat Sink Requirements
- Essentially No Switching Losses
- Halogen Free. "Green" Device (Note 1)
- Lead Free Finish/RoHS Compliant("P" Suffix Designates RoHS Compliant. See Ordering Information) (Note2)

**Maximum Ratings**

- Operating Junction Temperature Range : -55°C to +175°C
- Storage Temperature Range: -55°C to +175°C
- Thermal Resistance Junction to Ambient,Max(Note 3): 62°C/W
- Thermal Resistance Junction to Case,Typ : 0.41°C/W

**Applications**

- Solar Inverters
- Uninterruptible Power Supply
- Photovoltaic Inverter
- Battery Chargers
- Motor Drives

Parameter	Symbol	Rating	Unit	
Drain-Source Voltage	$V_{DS}$	750	V	
Gate-Source Voltage(Note 4)	$V_{GSmax}$	-8/+22	V	
Gate-Source Voltage	$V_{GSop}$	-5/+18	V	
Continuous Drain Current $V_{GS}=18V$	$I_D$	$T_C=25^{\circ}C$	107	A
		$T_C=100^{\circ}C$	72	
Pulsed Drain Current (Note 5)	$I_{DM}$	265	A	
Avalanche energy,Single Pulse (Note 6)	$E_{AS}$	975	mJ	
Total Power Dissipation	$P_D$	$T_C=25^{\circ}C$	365	W
		$T_C=100^{\circ}C$	182	

Note1:Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.

Note2:High Temperature Solder Exemptions Applied, see EU Directive Annex 7a.

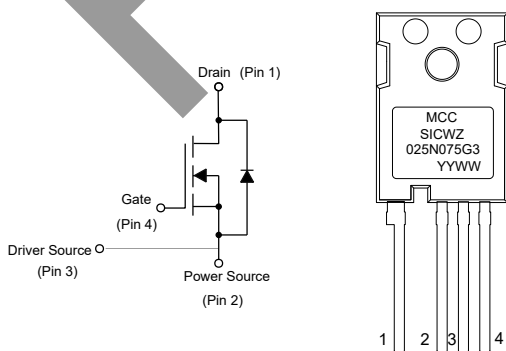
Note3:Device in a still air environment with  $T_A=25^{\circ}C$ .

Note4:AC  $f > 1Hz$ , duty cycle < 1%

Note5:Pulse Test: Pulse Width Limited by  $T_{jmax}$ .

Note6: $V_{DD}=75V, L=10mH$

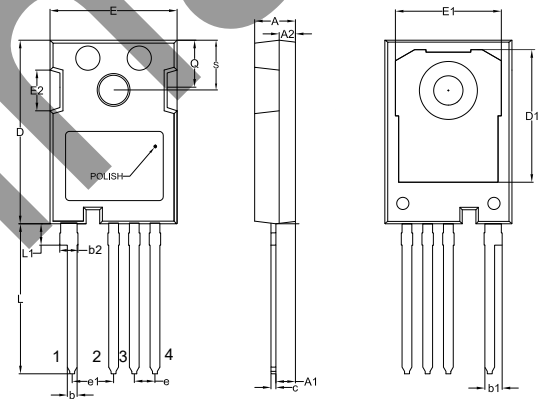
**Internal Structure and Marking Code**



Device Code: SICWZ025N075G3  
Date Code: YYWW (Year & Week)

**SiC  
N-CHANNEL  
MOSFET**

**TO-247-4**



DIM	INCHES		MM		NOTE
	MIN	MAX	MIN	MAX	
A	0.189	0.205	4.80	5.20	
A1	0.090	0.098	2.29	2.50	
A2	0.074	0.082	1.88	2.08	
b	0.043	0.054	1.10	1.36	
b1	0.093	0.108	2.35	2.75	
b2	0.094	0.112	2.39	2.84	
c	0.022	0.028	0.55	0.70	
D	0.917	0.929	23.30	23.60	
D1	0.640	0.663	16.25	16.85	
E	0.620	0.632	15.75	16.05	
E1	0.543	0.559	13.80	14.20	
E2	0.173	0.201	4.4	5.10	
e	0.100		2.54		
e1	0.199		5.06		
L	0.683	0.694	17.34	17.64	
L1	0.157	0.169	4.00	4.30	
P	0.138	0.148	3.51	3.75	Φ
Q	0.220	0.236	5.60	6.00	
S	0.220	0.248	5.60	6.30	

**Electrical Characteristics @ T<sub>J</sub>=25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =100uA	750			V
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =18V		10	100	nA
Drain source leakage current	I <sub>DSS</sub>	V <sub>DS</sub> =750V, V <sub>GS</sub> =0V		10	100	uA
Gate-Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =15mA	2.0	3.0	4.0	V
		V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =15mA, T <sub>J</sub> =175 °C		2.3		
Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =15V, I <sub>D</sub> =40A		25		mΩ
		V <sub>GS</sub> =18V, I <sub>D</sub> =40A		20	27	
		V <sub>GS</sub> =15V, I <sub>D</sub> =40A, T <sub>J</sub> =175 °C		35		
		V <sub>GS</sub> =18V, I <sub>D</sub> =40A, T <sub>J</sub> =175 °C		30		
Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =20V, I <sub>D</sub> =40A		27		S
		V <sub>DS</sub> =20V, I <sub>D</sub> =40A, T <sub>J</sub> =175 °C		26		
<b>Dynamic Characteristics</b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =0V, f=1MHz V <sub>AC</sub> =25mV		4121		pF
Output Capacitance	C <sub>oss</sub>		173			
Reverse Transfer Capacitance	C <sub>riss</sub>		8.2			
Coss Stored Energy	E <sub>oss</sub>			95		μJ
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =500V, V <sub>GS</sub> =-5/+18V, I <sub>D</sub> =40A		147		nC
Gate-Source Charge	Q <sub>gs</sub>		40			
Gate-Drain Charge	Q <sub>gd</sub>		69			
Internal Gate Resistance	R <sub>g</sub>	f=1MHz		2		Ω
Turn-On Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =500V, V <sub>GS</sub> =-5/+18V, R <sub>G</sub> =2.4Ω, I <sub>D</sub> =40A, L=100uH		18		ns
Turn-On Rise Time	t <sub>r</sub>		20			
Turn-Off Delay Time	t <sub>d(off)</sub>		30			
Turn-Off Fall Time	t <sub>f</sub>		12			
Turn-On switching energy	E <sub>on</sub>		125		μJ	
Turn-Off switching energy	E <sub>off</sub>		74			
<b>Diode Characteristics</b>						
Maximum Continuous Diode Forward Current	I <sub>S</sub>	V <sub>GS</sub> =-5V, T <sub>C</sub> =25 °C		89		A
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =-5V, I <sub>SD</sub> =20A		4.8		V
		V <sub>GS</sub> =0V, I <sub>SD</sub> =20A, T <sub>J</sub> =175 °C		3.0		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>SD</sub> =40A, V <sub>R</sub> =500V, V <sub>GS</sub> =-5V dI <sub>F</sub> /dt=1000A/μs		22		ns
Reverse Recovery Charge	Q <sub>rr</sub>		174		nC	
Peak reverse recovery current	I <sub>rrm</sub>		12		A	

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

Figure 1. Output Characteristics  $T_j = -55^\circ\text{C}$

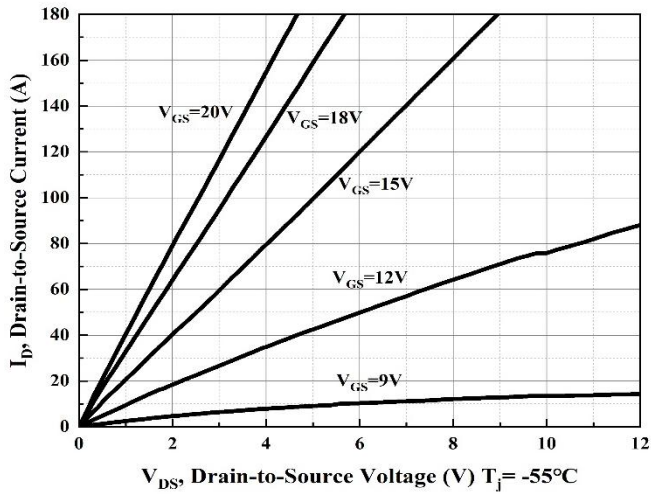


Figure 2. Output Characteristics  $T_j = 25^\circ\text{C}$

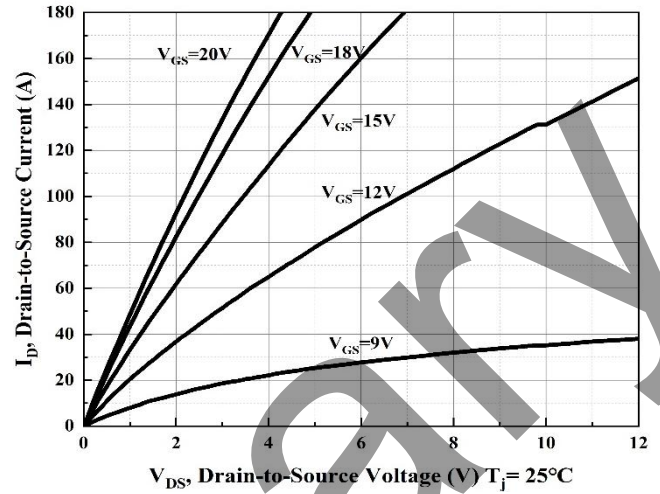


Figure 3. Output Characteristics  $T_j = 175^\circ\text{C}$

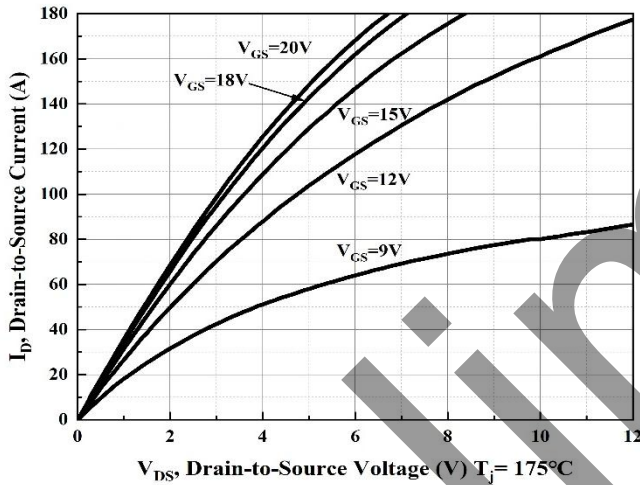


Figure 4. Transfer Characteristics

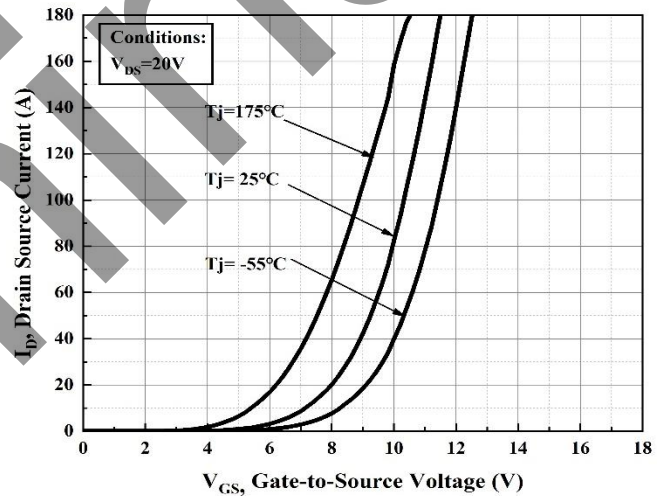


Figure 5. On-resistance vs. Temperature

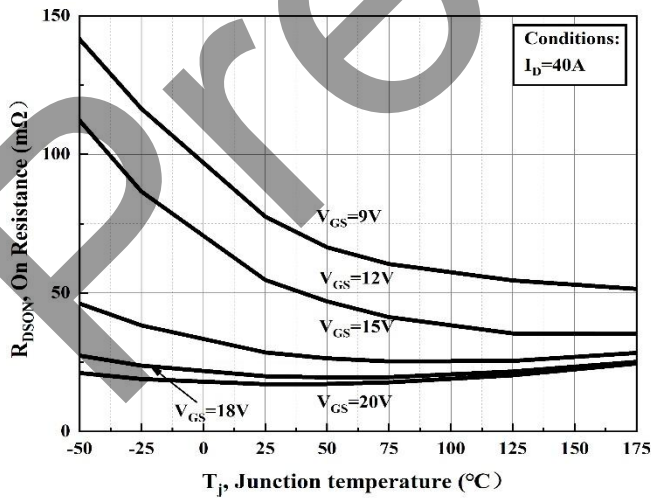
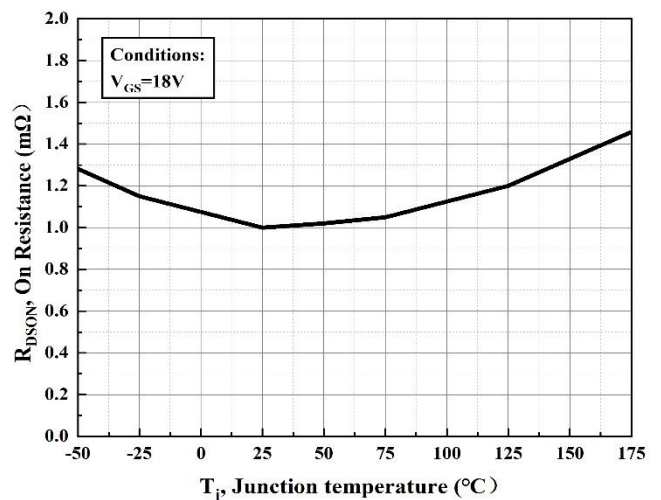


Figure 6. Normalized on-resistance vs. Temperature



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

Figure 7. On-resistance vs. Drain Current

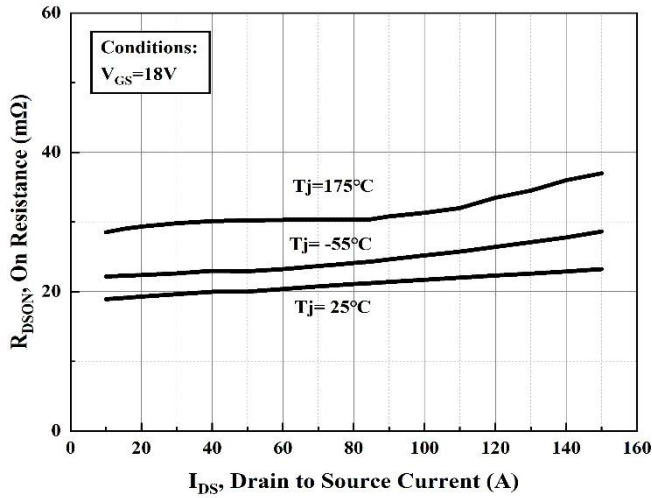


Figure 8. Body Diode Characteristic at  $T_j=25^\circ\text{C}$

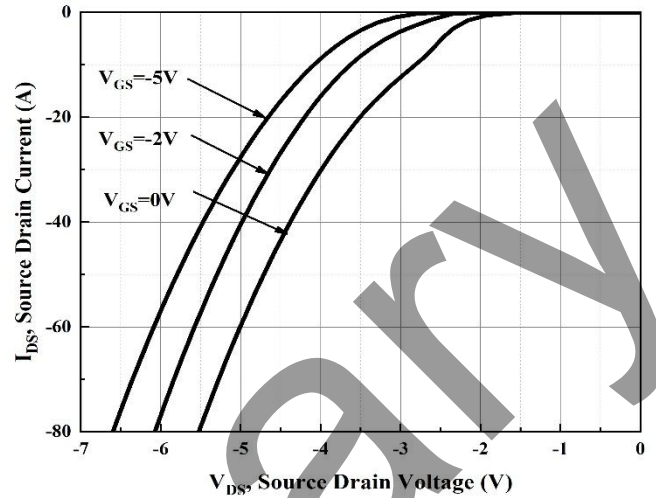


Figure 9. Body Diode Characteristic

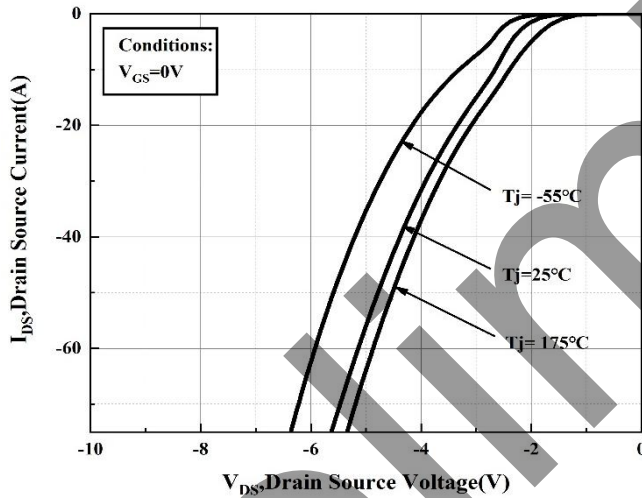


Figure 10. 3<sup>rd</sup> quadrant Characteristic at  $T_j=25^\circ\text{C}$

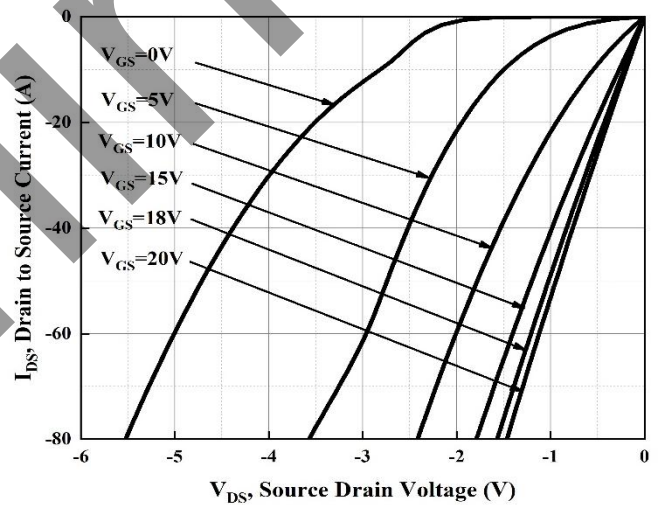


Figure 11. Threshold Voltage vs. Temperature

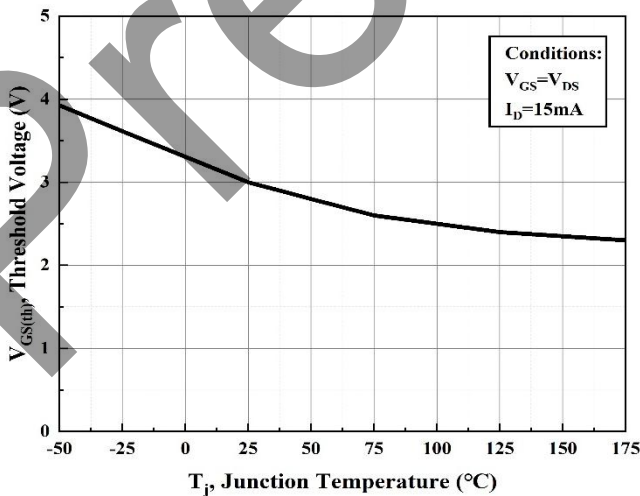
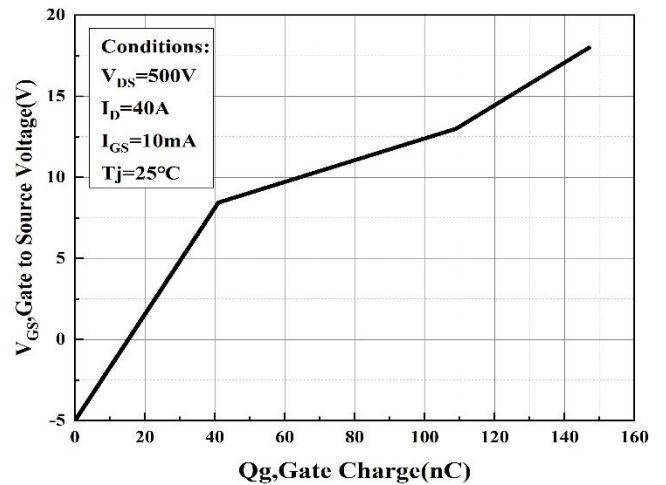


Figure 12. Gate Charge Characteristic



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

Figure 13. Capacitances vs. Drain Source Voltage (0-650V)

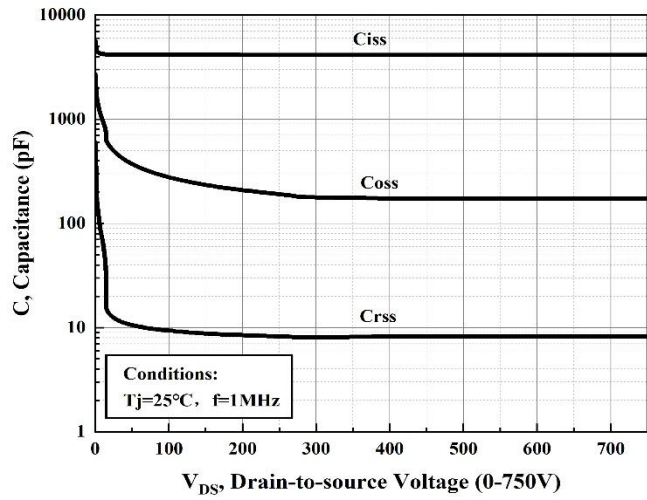


Figure 14. Capacitances vs. Drain Source Voltage (0-200V)

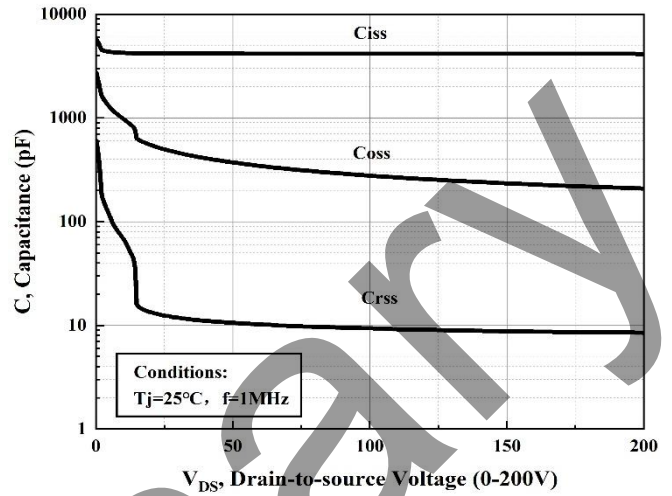


Figure 15. Output Capacitor Stored Energy

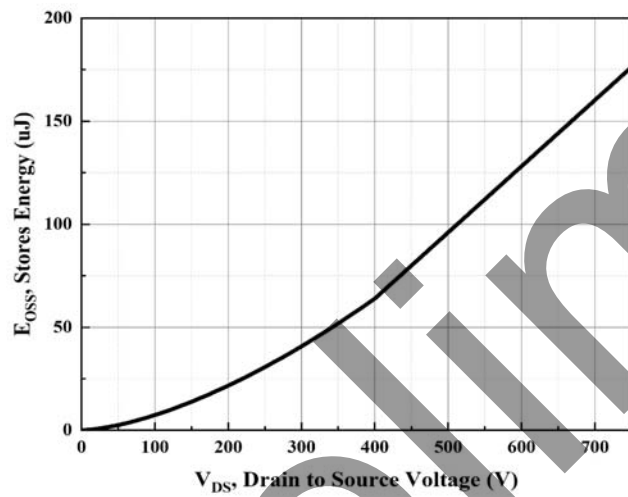


Figure 16. Power Dissipation Derating

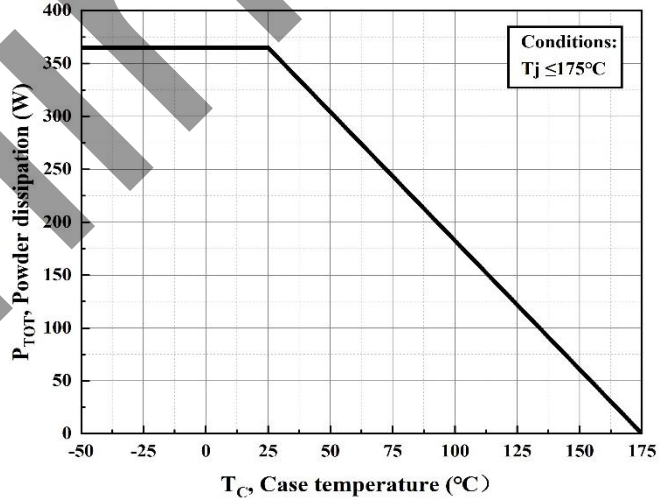


Figure 17. Drain Current Derating

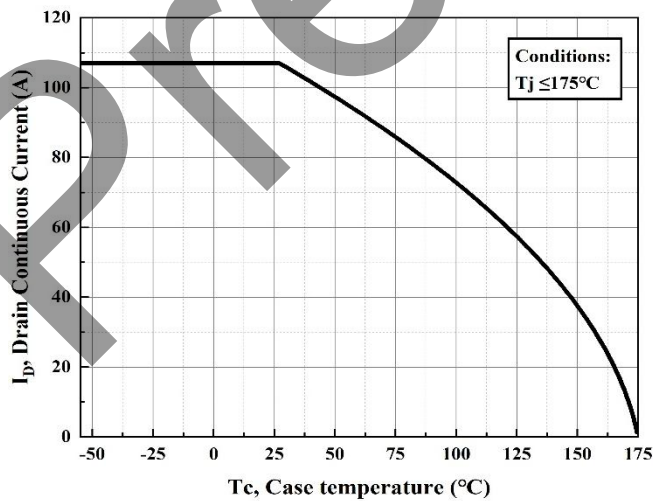
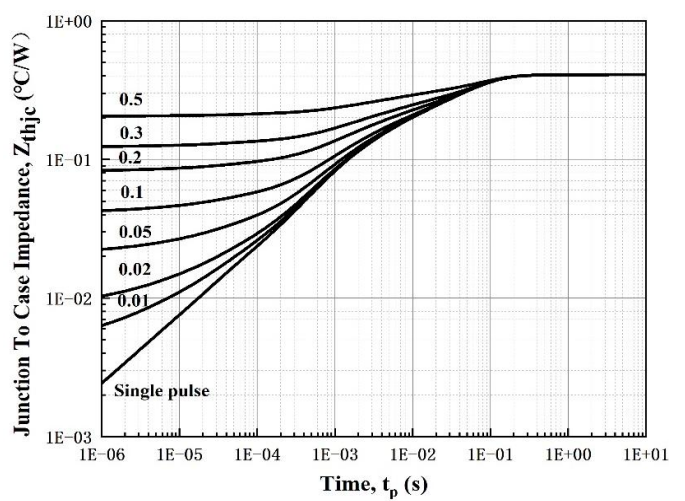


Figure 18. Transient Thermal Impedance (Junction - Case)



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

Figure 19. Clamped Inductive Switching Energy vs. Drain Current

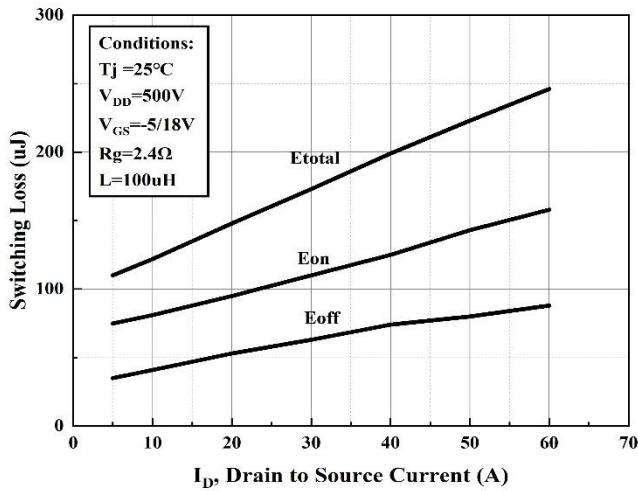


Figure 20. Clamped Inductive Switching Energy vs. Rg

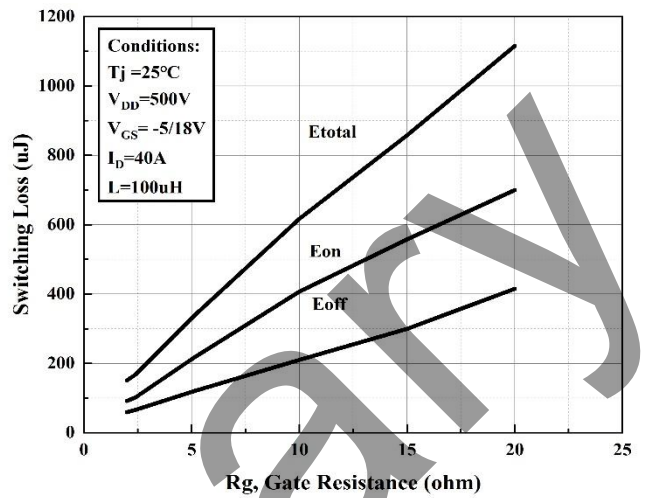


Figure 21. Switching Times vs. Rg

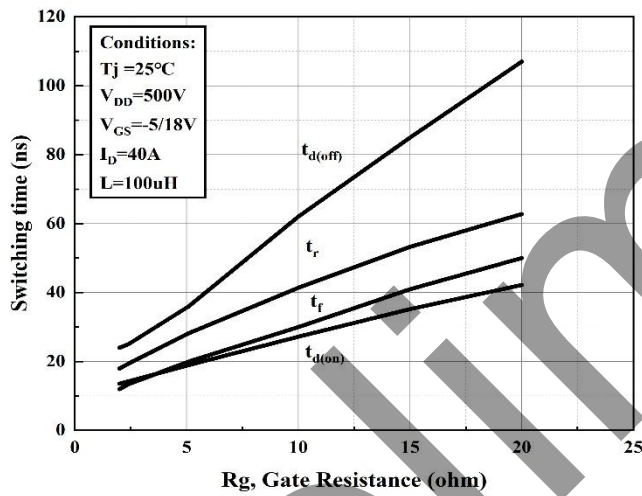
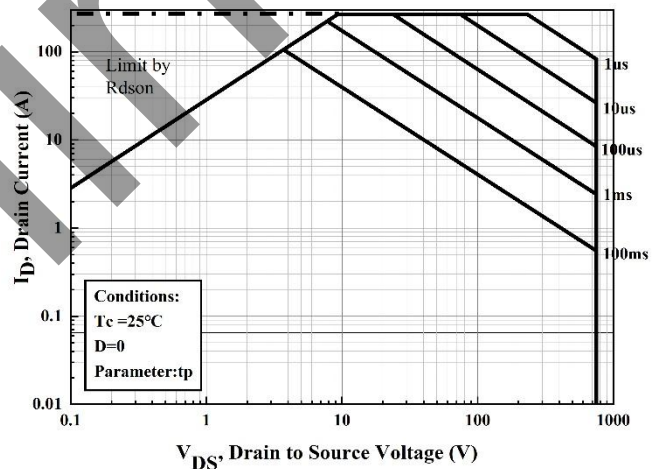


Figure 22. Safe Operating Area



## Ordering Information

Device	Packing
Part Number-BP	Tube:30pcs/Tube, 1.8K/Ctn;

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