1A01K170K

Silicon Carbide Power MOSFET

N-Channel Enhancement Mode

V_{DS}	=	1700 V
$R_{DS(on)}$	=	1.0 Ω
I_{DS}@25℃	=	5.0 A

Features

- High Blocking Voltage with low On-Resistance
- High Speed Switching with Low Capacitances
- Easy to Parallel and Simple to Drive
- Ultra-low Drain-gate capacitance
- Avalance Ruggedness

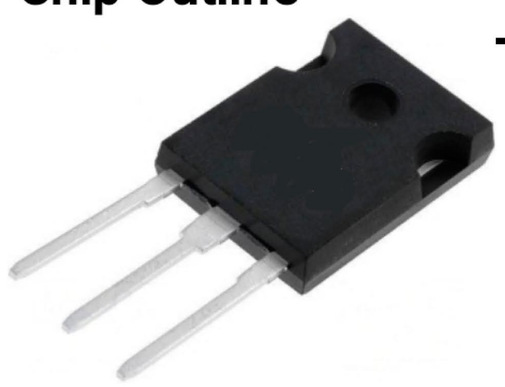
Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased System Reliability
- Increased System Switching Frequency

Applications

- Auxiliary Power Supplies
- Switch Mode Power Supplies
- High-voltage Capacitive

Chip Outline



Part Number	Package
1A01K170K	TO-247-3

Maximum Ratings (T_C=25˚C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain-Source Voltage	1700	V	V_{GS}=0V, I_{DS}=100μA	
V_{GSmax}	Gate-Source Voltage	-10/+25	V	Absolute maximum values	
V_{GSop}	Gate-Source Voltage	-5/+20	V	Recommended operational values	
I_D	Continuous Drain Current	5.0	A	V_{GS}=20V, Tc=25℃	
		3.5	A	V_{GS}=20V, Tc=100℃	
$I_{D(pulse)}$	Pulsed Drain Current	6.0	A	Pule width t_p limited by T_{jmax}	
P_D	Power Dissipation	69	W	Tc=25℃, T_J=150℃	
T_J,T_{ST}	Operating Junction and Storage Temperature	-55 to +150	℃		
T_L	Solder Temperature	260	℃	1.6mm(0.063") from case for 10s	

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Electrical Characteristics(T_C=25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1700	/	/	V	V_{GS}=0V, I_{DS}=100μA	
$V_{GS(th)}$	Gate Threshold Voltage	2.5	3.0	4.5	V	V_{DS}=V_{GS}, I_{DS}=1mA	
			2.2	/		V_{DS}=V_{GS},I_{DS}=1mA, T_J=150℃	
I_{DSS}	Zero Gate Voltage Drain Current	/	1	100	μA	V_{DS}=1700V, V_{GS}=0V	
I_{GSS}	Gate-Source Leakage Current	/		250	nA	V_{DS}=0V, V_{GS}=20V	
$R_{DS(on)}$	Drain-Source On-State Resistance	/	1.0	1.3	Ω	V_{GS}=20V, I_D=2A	
		/	1.5			V_{GS}=20V, I_D=2A, T_J=150℃	
g_{fs}	Transconductance	/	1.15	/	S	V_{DS} = 20 V, I_D = 2 A	
		/	1.30	/		V_{DS}=20V, I_D = 2 A, T_J= 150℃	
C_{iss}	Input Capacitance	/	186	/	pF	V_{GS}=0V V_{DS}=1000V f=1MHz V_{AC}=25mV	
C_{oss}	Output Capacitance	/	12	/			
C_{rss}	Reverse Transfer Capacitance	/	1.6	/			
E_{oss}	C_{oss} Stored Energy	/	6.2	/	μJ		
t_{don}	Turn-On Delay Time	/	5.2	/	ns	V_{DS}=1200V,V_{GS}=-5V/20V I_D=30A,R_g=2.5Ω R_L=600Ω (TO-247-3Package)	
t_r	Rise Time	/	9.4	/			
t_{doff}	Turn-Off Delay Time	/	13.2	/			
t_f	Fall Time	/	22.0	/			
E_{ON}	Turn-On Switching Energy	/	48	/	μJ	V_{DS}=1200V,V_{GS}=-5V/20V I_D=2A,R_g=2.5Ω,L=1500μH (TO-247-3Package)	
E_{OFF}	Turn-Off Switching Energy	/	18	/			
R_G	Internal Gate Resistance	/	22	/	Ω	f=1MHz open drain	
Q_{gs}	Gate Charge Total	/	5.2	/	nC	V_{DS}=1200V V_{GS}=-5V/20V I_D=2A	
Q_{gd}	Gate to Source Charge	/	7.3	/			
Q_g	Gate to Drain Charge	/	21.8	/			

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	4.2		V	V_{GS}=-5V, I_F=1A	
		3.9			V_{GS}=-5V, I_F=1A , T_J=150℃	
I_s	Continuous Diode Forward Current		4.0	A	T_C=25℃	
t_{rr}	Reverse Recover time	25		ns	V_{GS}=-5V,I_{SD}=2A,V_R=1200V	
Q_{rr}	Reverse Recovery Charge	15		nC		
I_{rrm}	Peak Reverse Recovery Current	2.8		A		

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance	1.8	2.0	℃/W		

Typical Performance

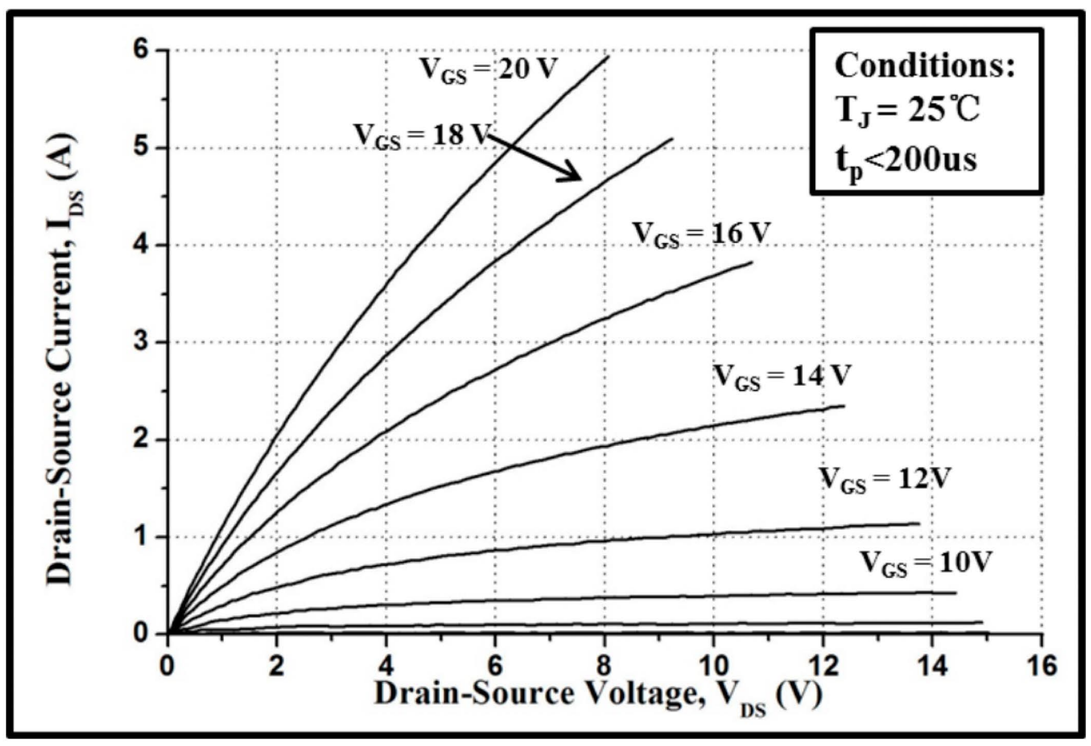

Figure 1. Typical Output Characteristics T_J= 25℃

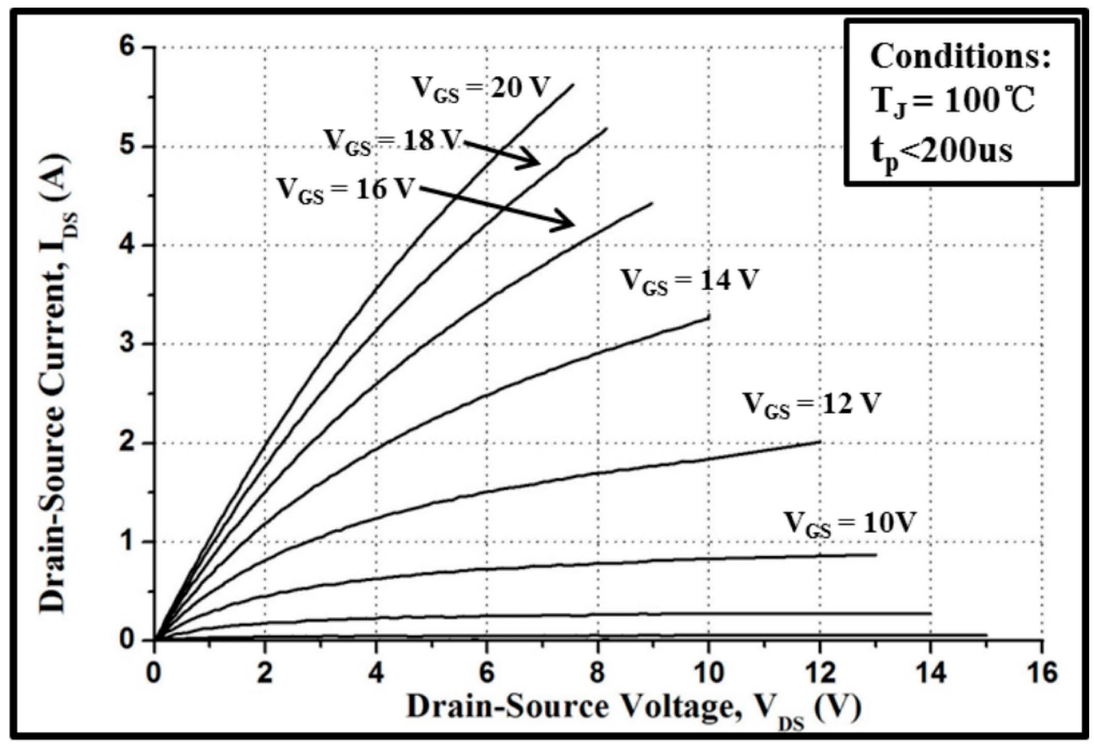

Figure 2. Typical Output Characteristics T_J= 100℃

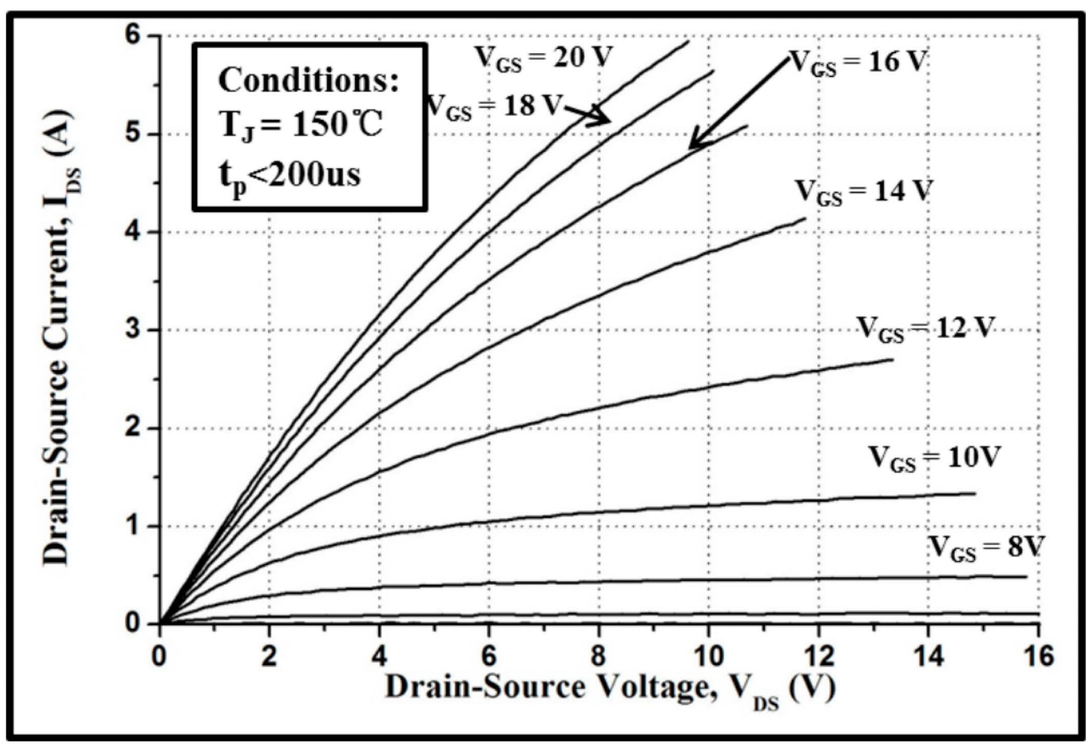

Figure 3. Typical Output Characteristics T_J=150℃

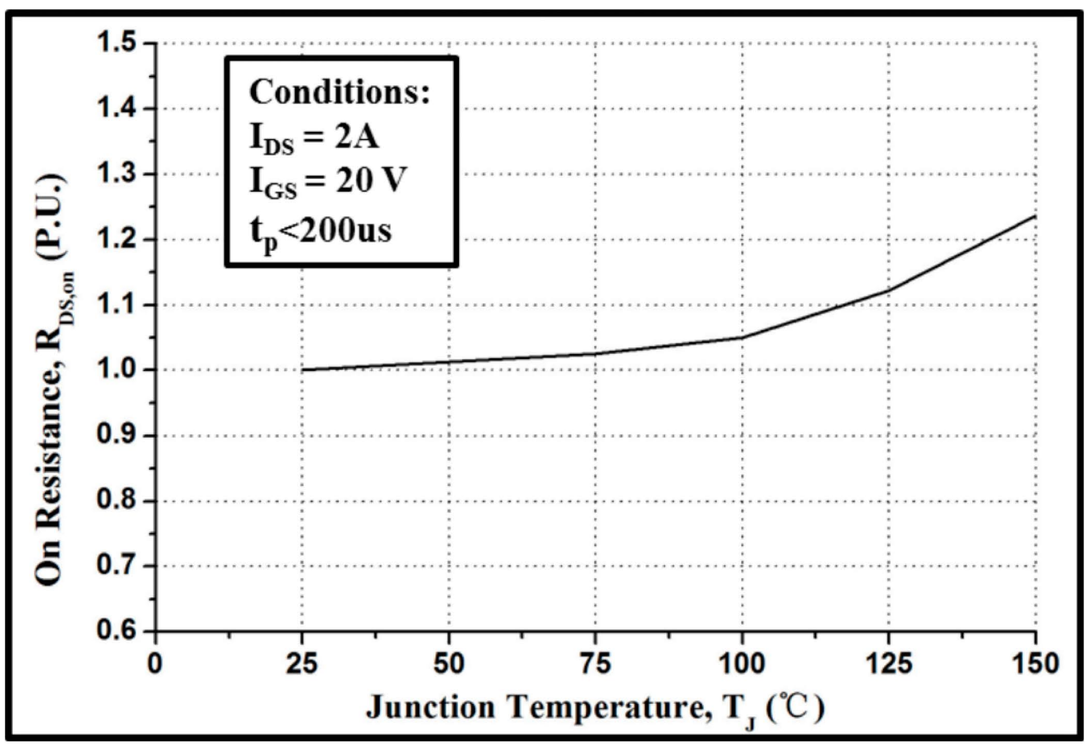

Figure 4. Normalized On-Resistance vs. Temperature

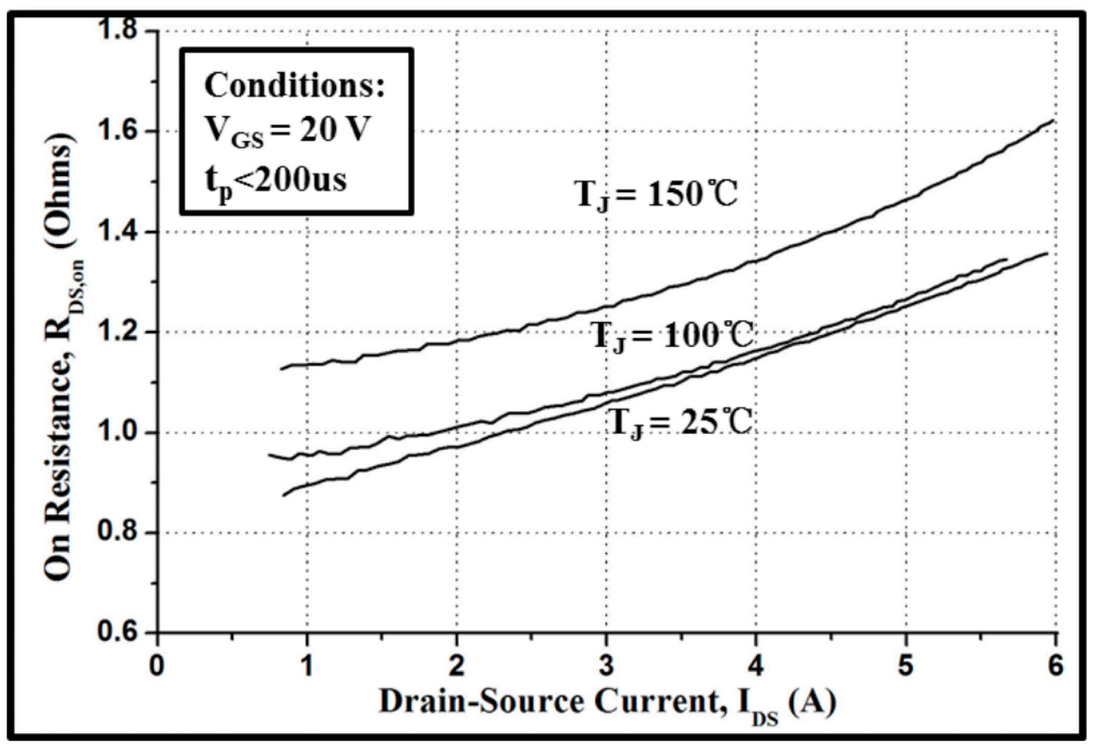

Figure 5. On-Resistance vs. Drain Current

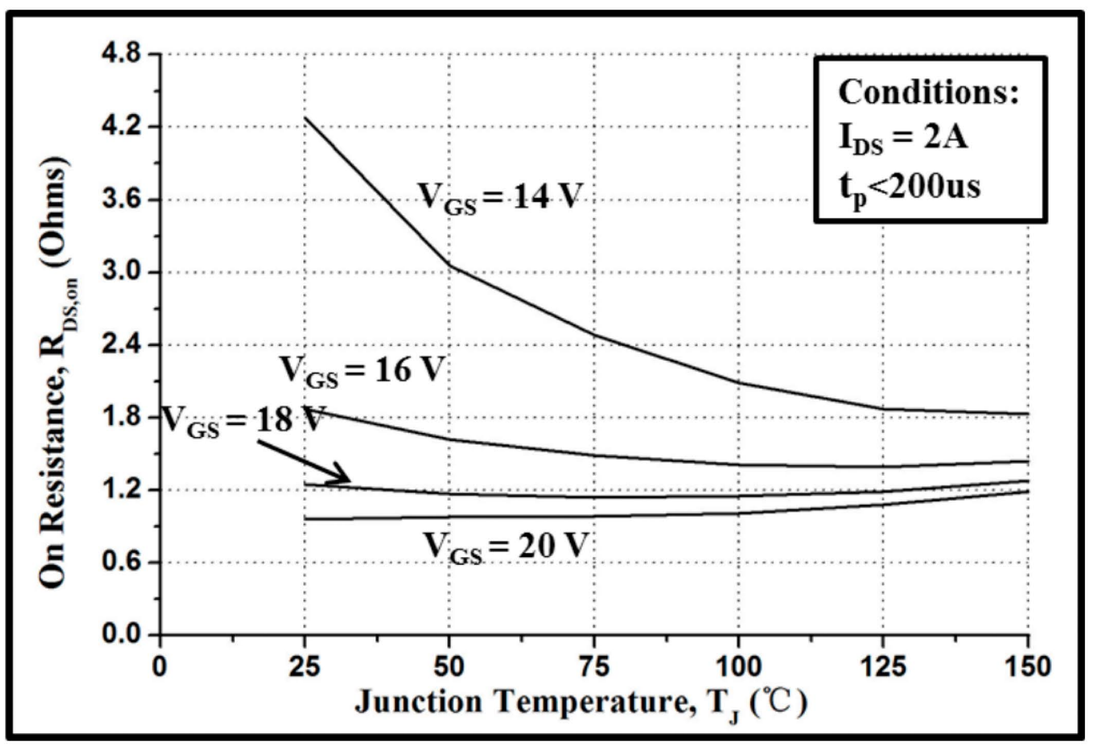

Figure 6. On-Resistance vs. Temperature

Typical Performance

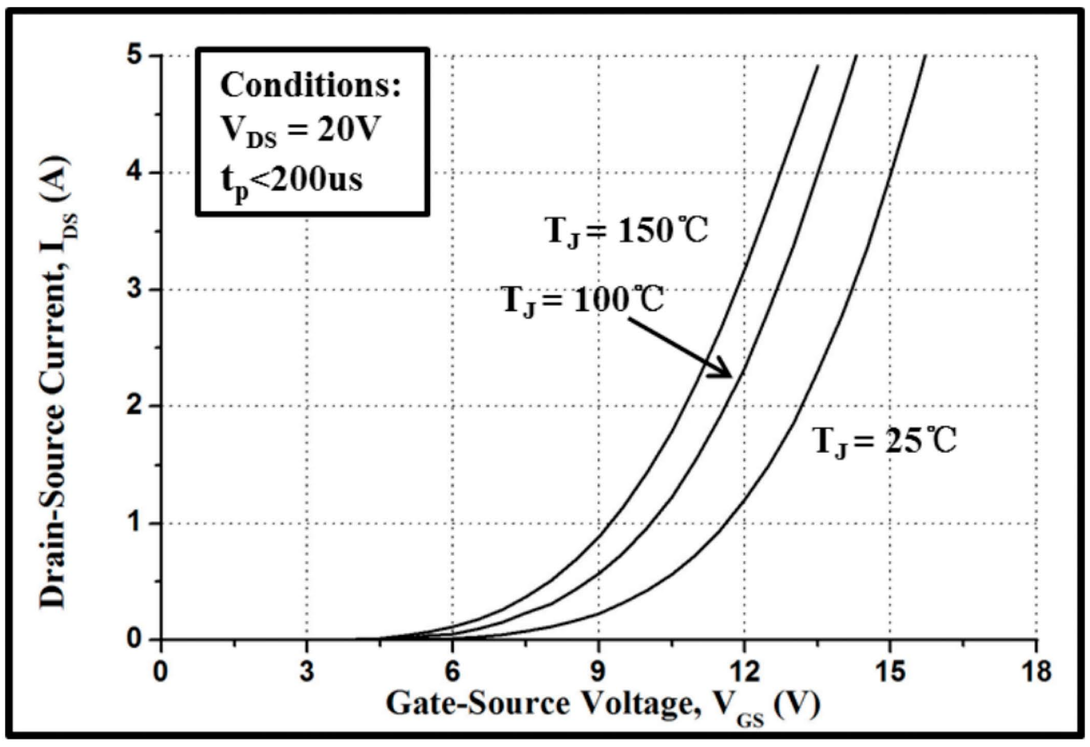

Figure 7. Typical Transfer Characteristics

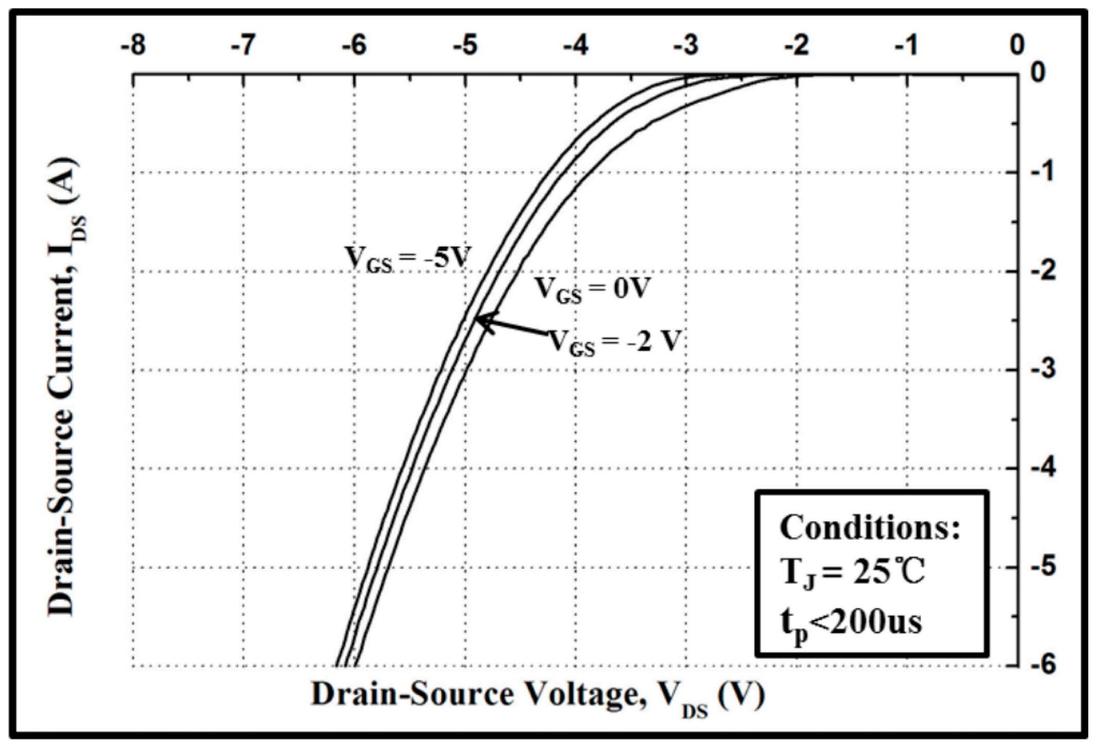

Figure 8. Body Diode Characteristics at 25℃

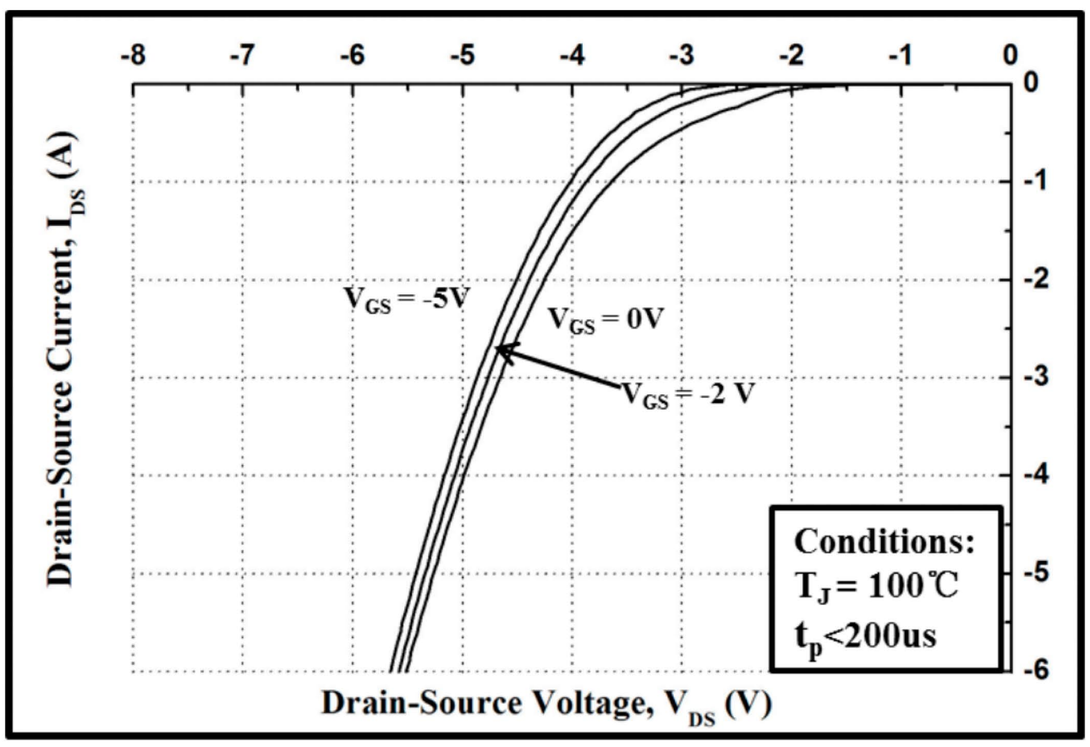

Figure 9. Body Diode Characteristics at 100℃

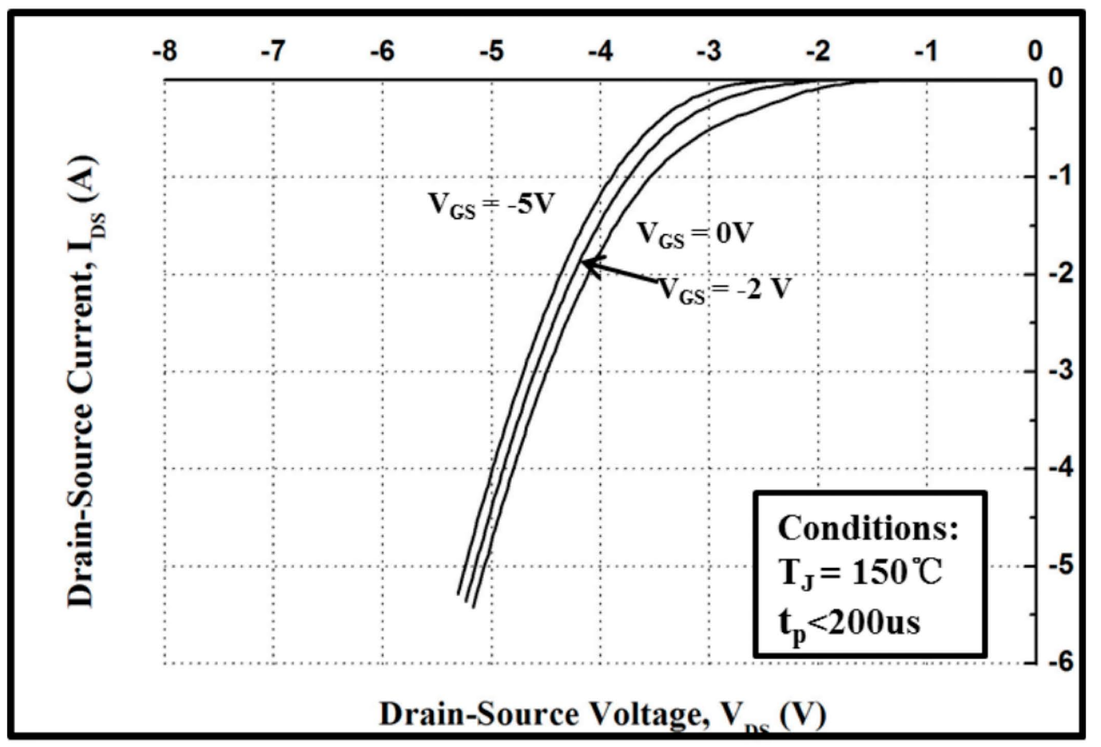

Figure 10. Body Diode Characteristics at 150℃

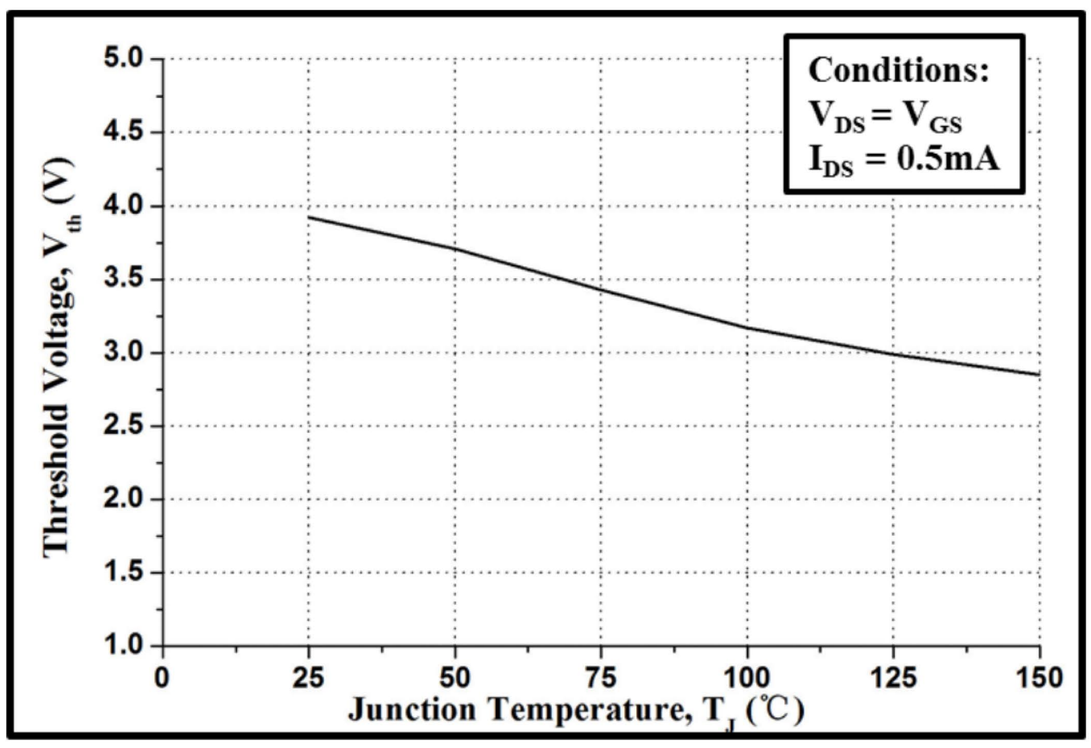

Figure 11. Gate Threshold Voltage vs. Temperature

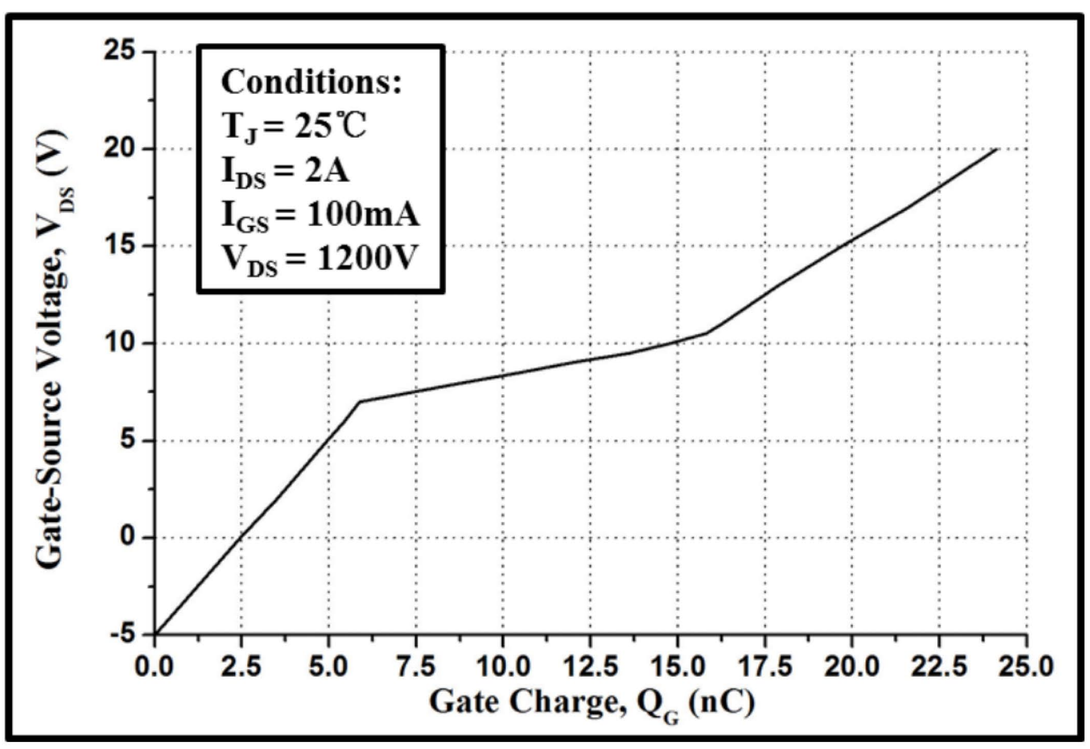

Figure 12. Gate Charge Characteristic

Typical Performance

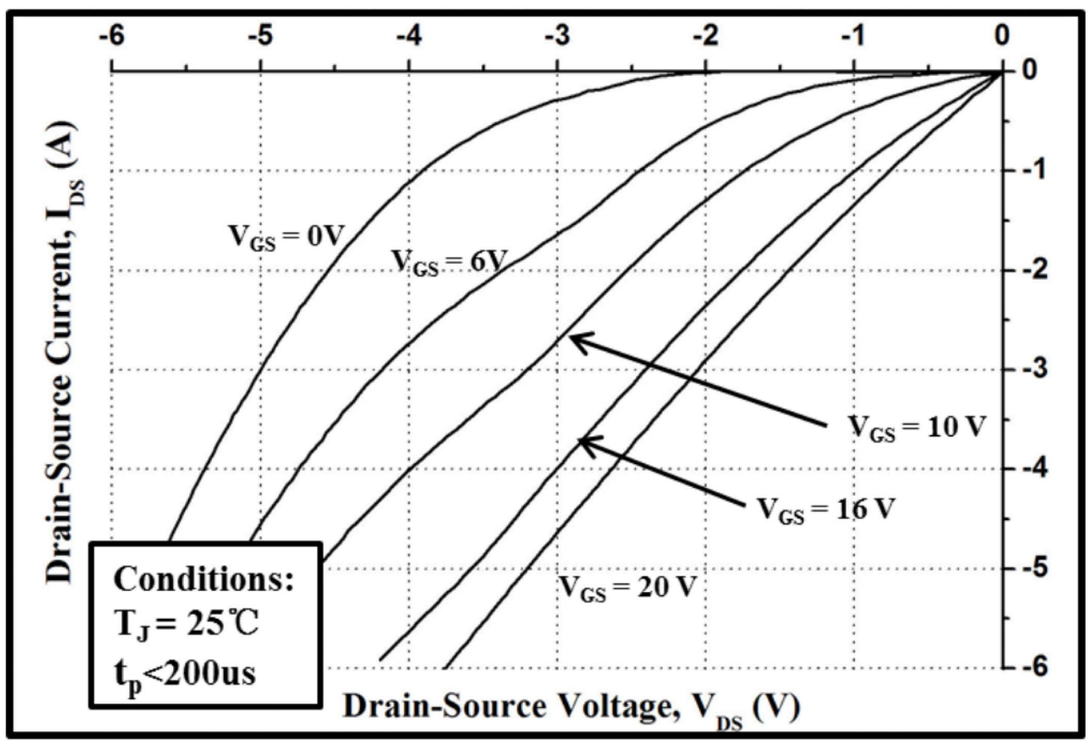

Figure 13. 3rd Quadrant Characteristics at 25℃

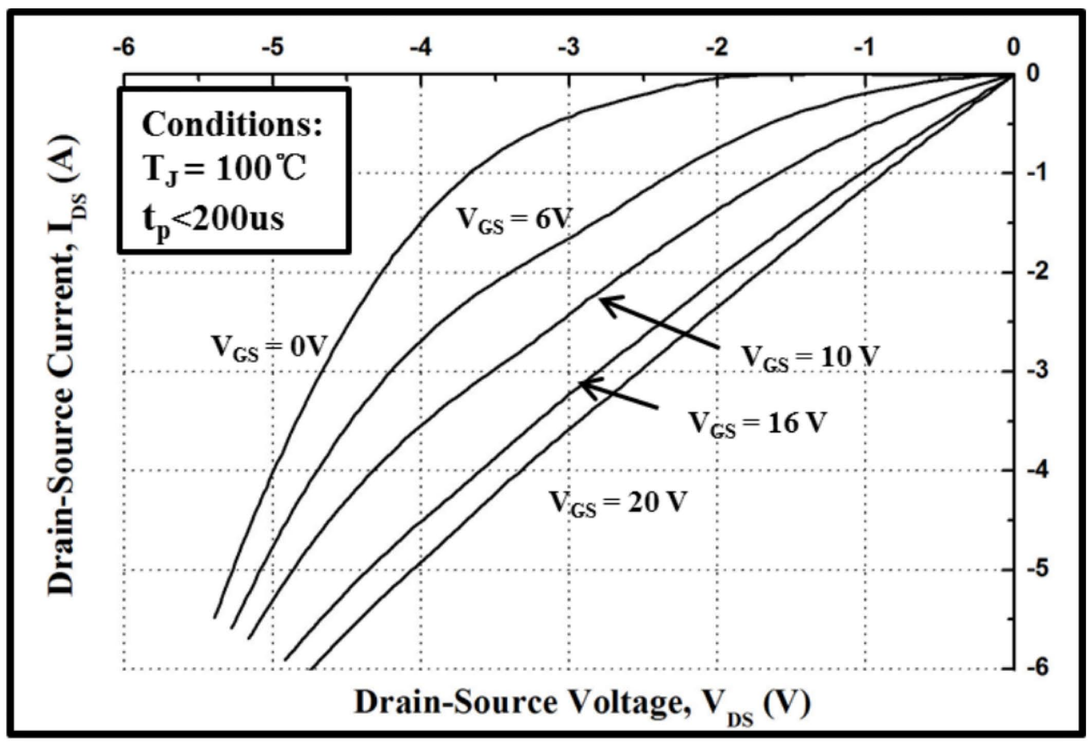

Figure 14. 3rd Quadrant Characteristics at 100℃

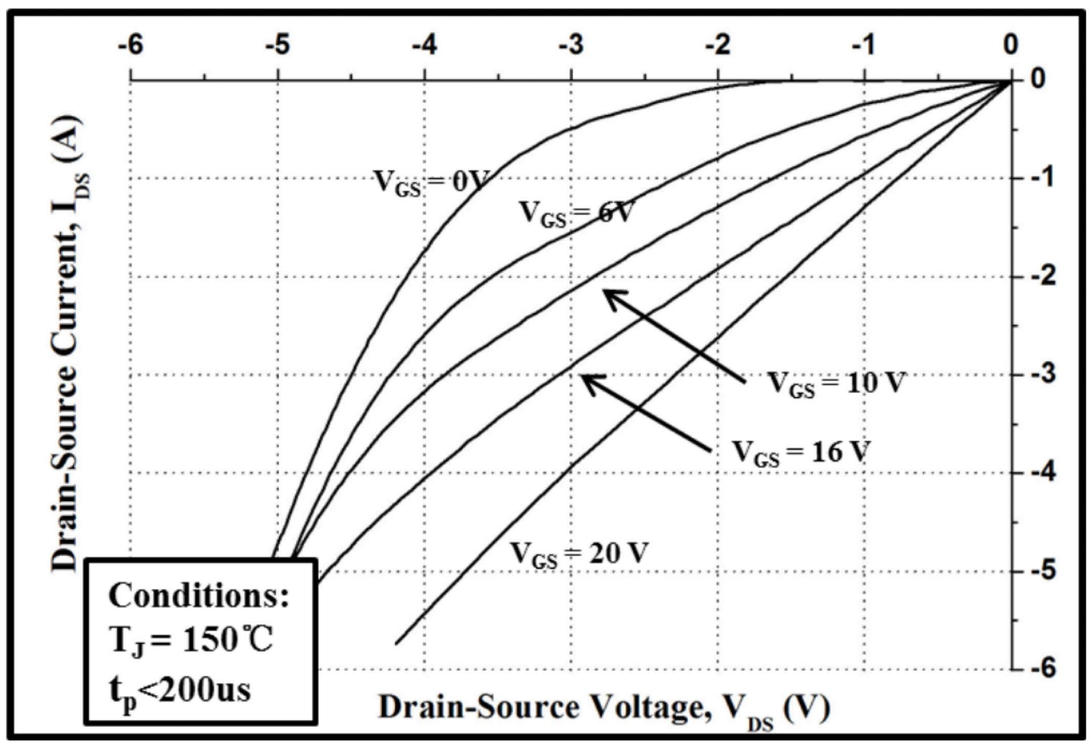

Figure 15. 3rd Quadrant Characteristics at 150℃

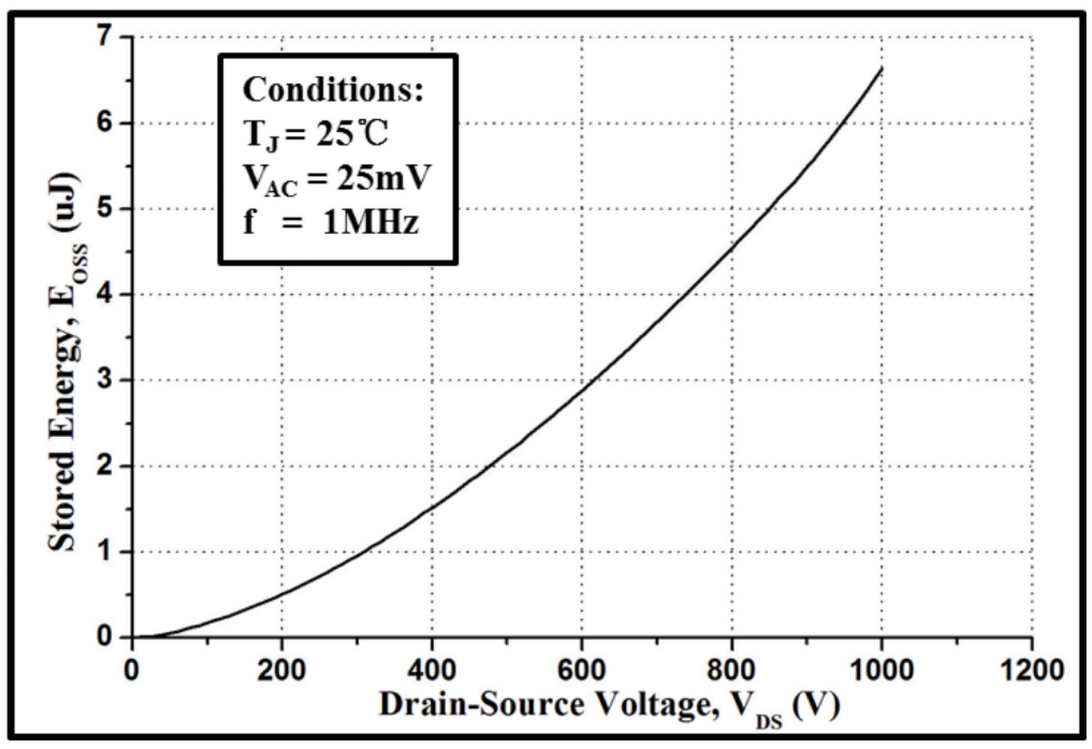

Figure 16. Output Capacitor Stored Energy

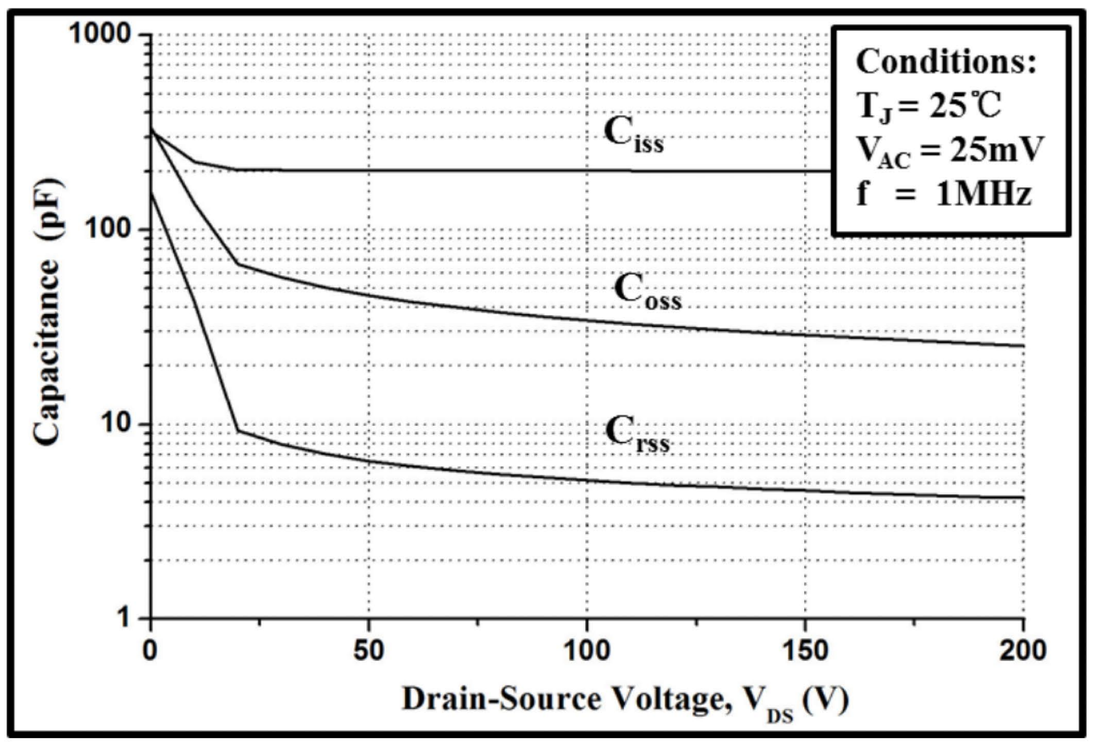

Figure 17. Capactances vs. Drain-Source Voltage

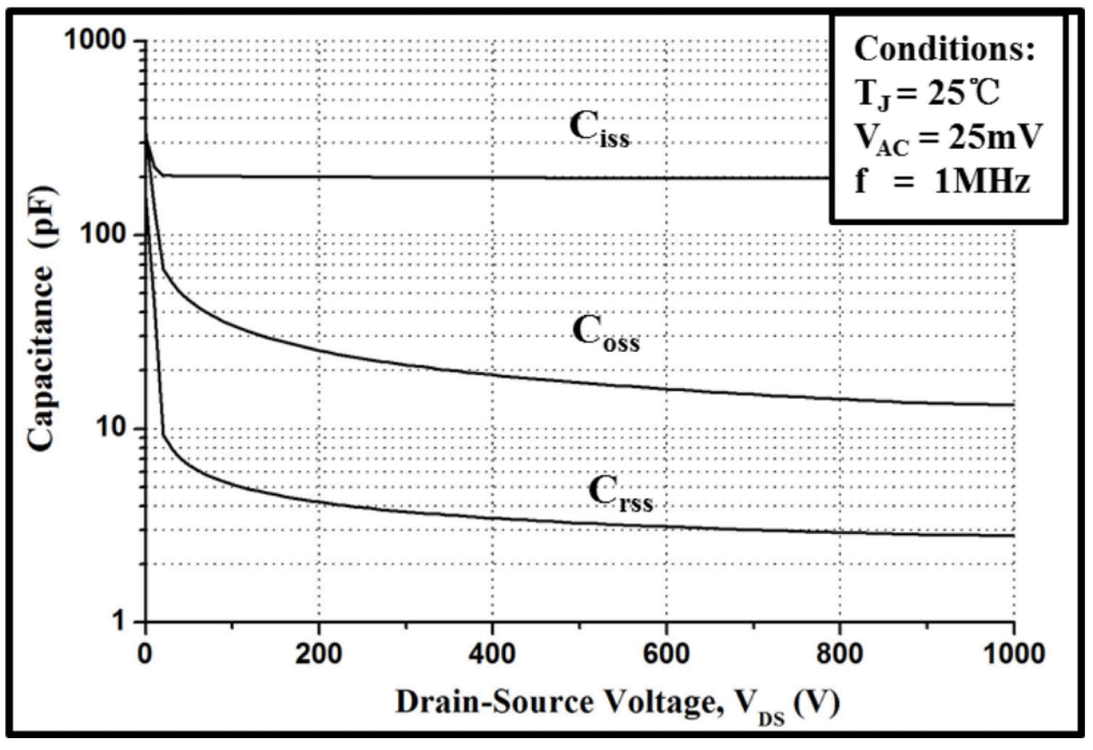

Figure 18. Capactances vs. Drain-Source Voltage