

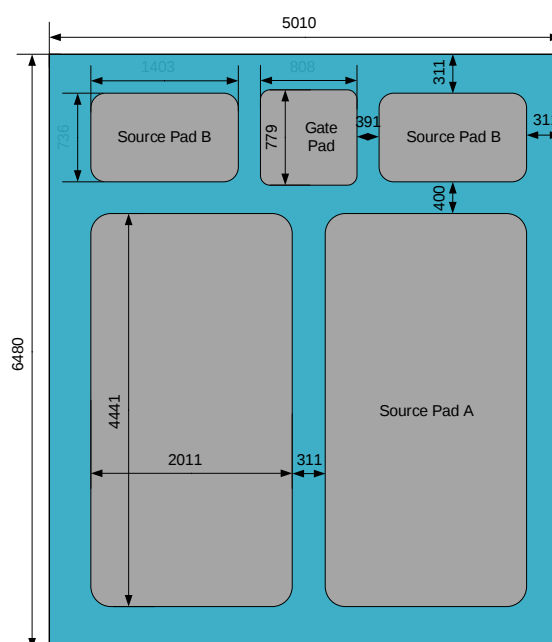
Features

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

Part NO.	MS1M013120B	
V_{DS}	=	1200 V
$I_D(T_c=25^\circ\text{C})$	=	175 A
$R_{DS(on)}$	=	13 m Ω

Wafer Parameters

Parameter	Typ.	Unit
Die Size	6480 x 5010	μm
Gate Pad Opening	808 x 779	μm
Source Pad A Opening	4441 x 2011	μm
Source Pad B Opening	1403 x 736	μm
Wafer Diameter	150	mm
Thickness	175 ± 20	μm
Anode Metalization (Al)	4	μm
Cathode Metalization (Ti/Ni/Ag)	0.2/0.3/2	μm
Grossdie	415	

Chip Outline (unit: μm)

Maximum ratings ($T_j=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Value	Unit
V_{DS}	Drain-Source Voltage		1200	V
I_D^*	Continuous Drain Current	$T_c=25^\circ\text{C}$ $T_c=100^\circ\text{C}$	175 125	A
I_{DM}^*	Peak Drain Current	Pulse width t_p limited by T_{jmax}	360	A
V_{GSmax}	Gate-Source Voltage		-8/+22	V
V_{GSop}	Recommend Gate-Source Voltage		-4/+18	V
T_j	Operating Junction Temperature		-40~175	$^\circ\text{C}$
T_{stg}	Storage Temperature		-40~175	$^\circ\text{C}$

* Verified by design

Electrical Characteristics**Static Characteristics**

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$I_D=100\mu\text{A}$, $V_{GS}=0\text{V}$	1200			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=1200\text{V}$, $V_{GS}=0\text{V}$		1		μA
I_{GSS}	Gate-Source Leakage Current	$V_{DS}=0\text{V}$, $V_{GS}=18\text{V}$			250	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=35\text{mA}$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$	2	2.8 1.9	4	V
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=18\text{V}$, $I_D=75\text{A}$ $T_j=25^\circ\text{C}$ $T_j=175^\circ\text{C}$		13 23		$\text{m}\Omega$

Dynamic Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	$V_{DS}=1000V, f=100kHz, V_{GS}=0V$		6893		pF
C_{oss}	Output Capacitance			249		pF
C_{rss}	Reverse Transfer Capacitance			19		pF
$R_{G(int)}$	Internal Gate Resistance	$f=1MHz$		2.4		Ω
Q_g	Total Gate Charge	$V_{DS}=800V, I_D=75A, V_{GS}=-4/18V$		306		nC
Q_{gs}	Gate to Source Charge			87		nC
Q_{gd}	Gate to Drain Charge			80		nC

Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
V_{SD}	Diode Forward Voltage	$V_{GS}=-4V, I_{SD}=37.5A$ $T_j=25^\circ C$ $T_j=175^\circ C$		4.6 3.9		V
I_S	Continuous Diode Forward Current	$V_{GS}=-4V$ $T_c=25^\circ C$ $T_c=100^\circ C$		150 82		A
t_{rr}	Reverse Recovery Time	$V_{GS}=-4V, I_{SD}=75A, V_R=800V, di/dt=7000A/\mu s$		15		ns
Q_{rr}	Reverse Recovery Charge			434		nC
I_{rrm}	Peak Reverse Recovery Current			51		A

Typical Performance

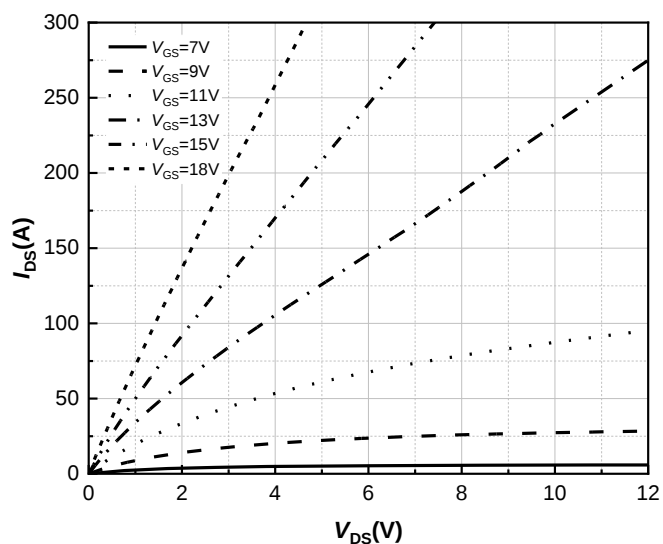


Figure 1. Output Characteristics
 $T_j = -40^\circ\text{C}$

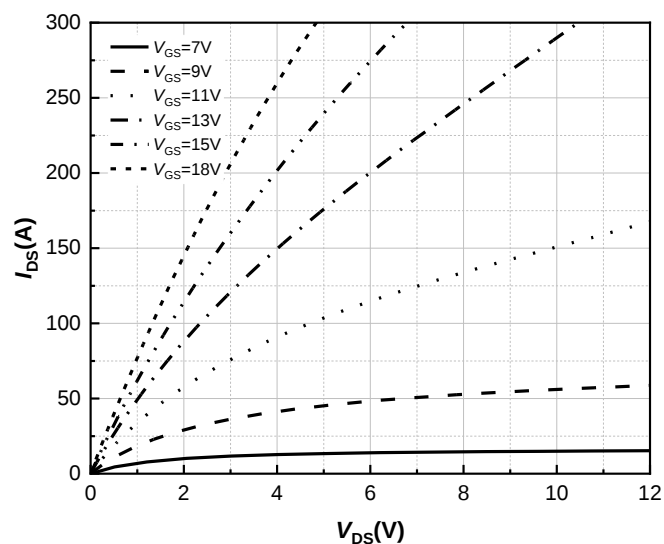


Figure 2. Output Characteristics
 $T_j = 25^\circ\text{C}$

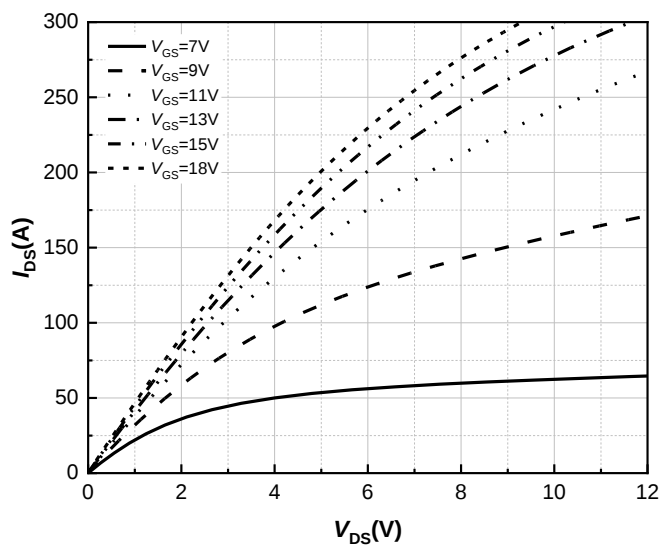


Figure 3. Output Characteristics
 $T_j = 175^\circ\text{C}$

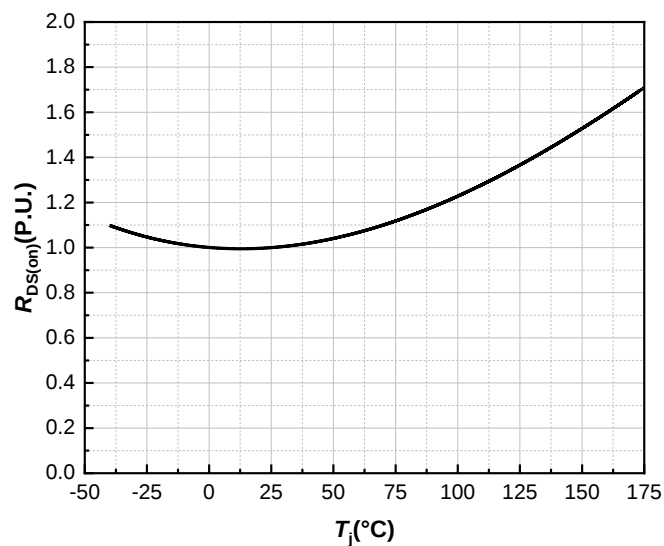


Figure 4. Normalized On-Resistance vs.
Temperature

Typical Performance

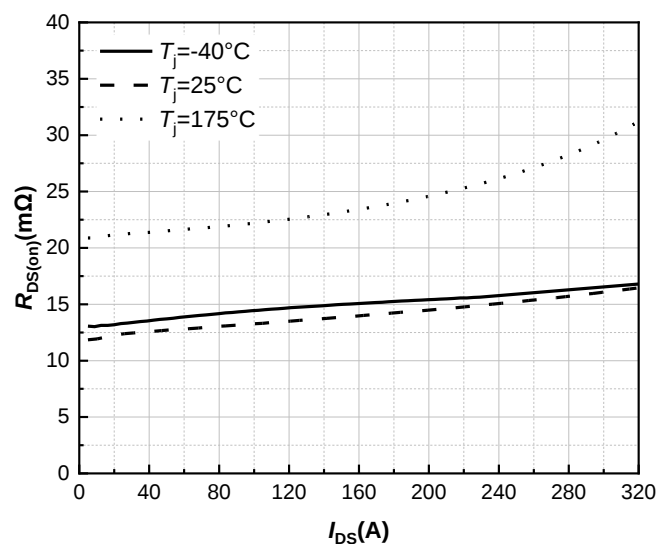


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

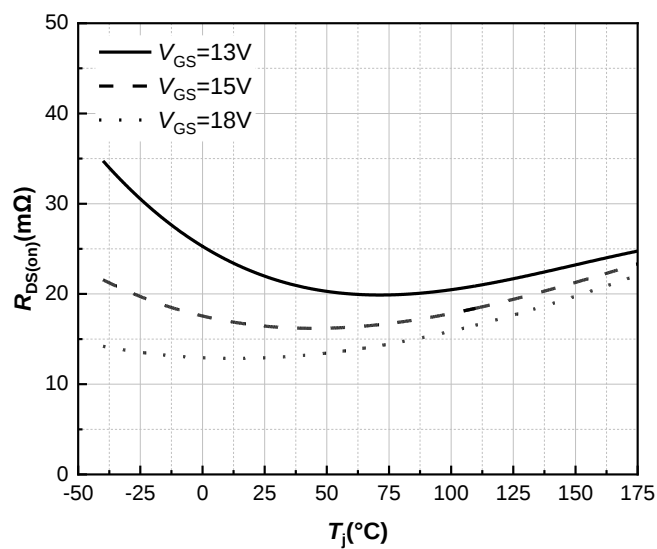


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

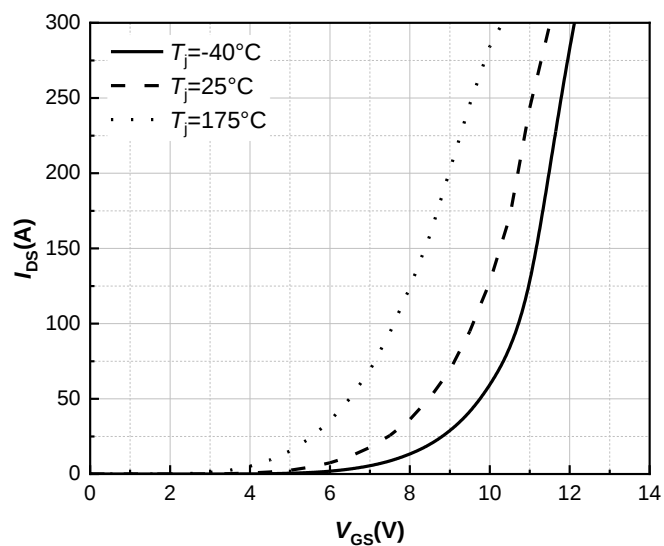


Figure 7. Transfer Characteristic for Various Junction Temperatures
 $V_{DS}=20V$

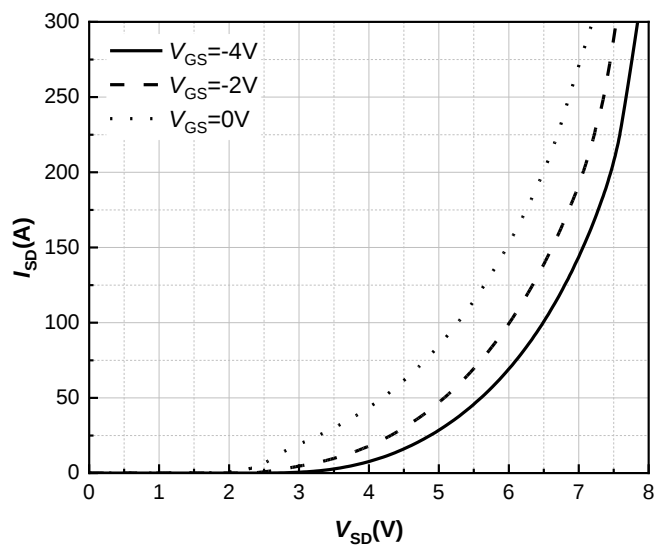


Figure 8. Body Diode Characteristic
 $T_j=-40^{\circ}C$

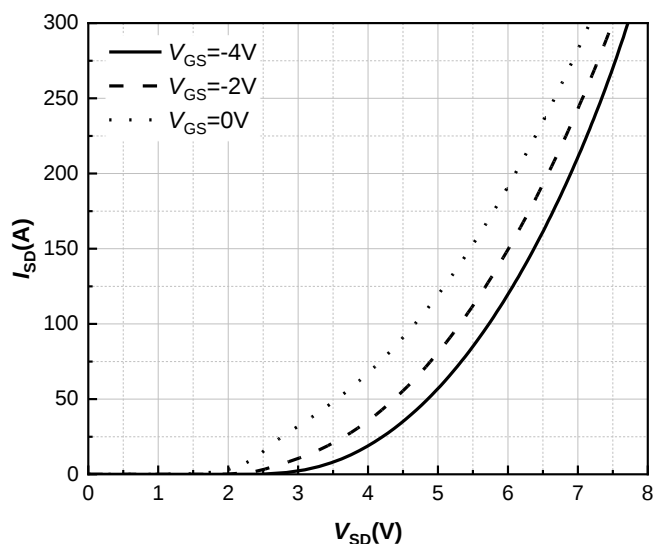
Typical Performance

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

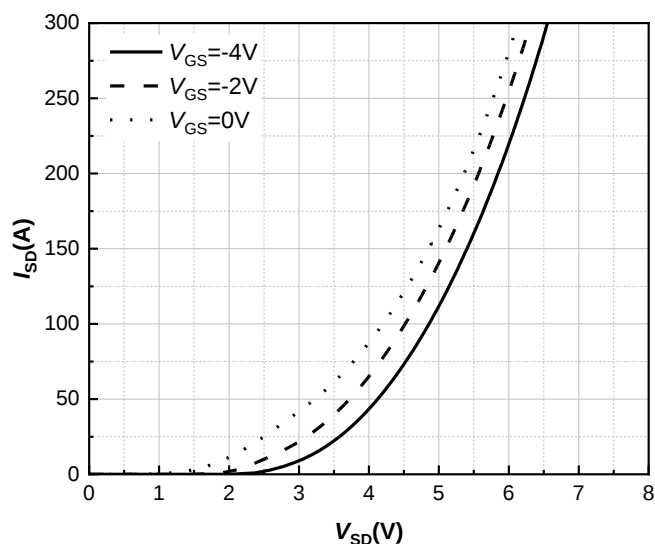


Figure 10. **Body Diode Characteristic**
 $T_j = 175^\circ\text{C}$

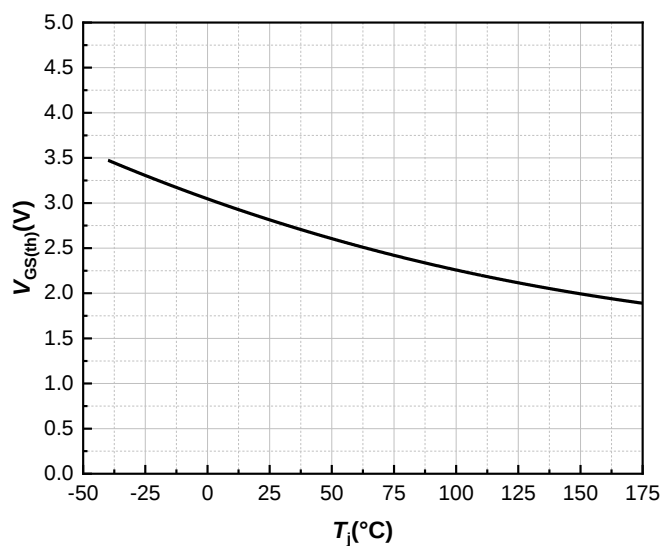


Figure 11. **Threshold Voltage vs. Temperature**

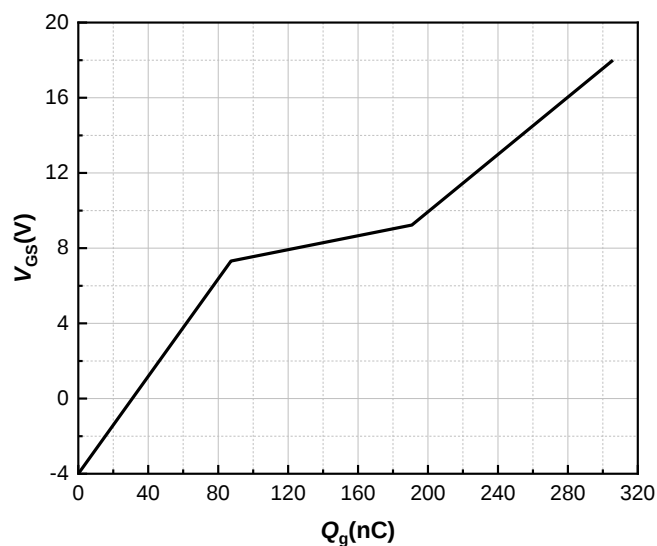


Figure 12. **Gate Charge Characteristics**

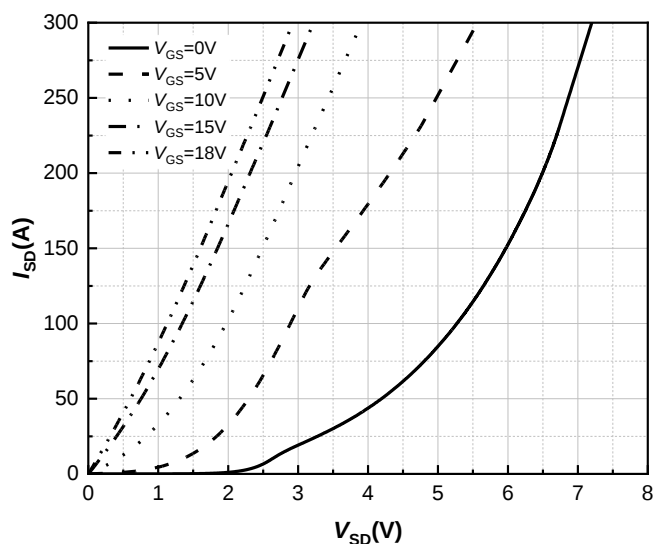
Typical Performance

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

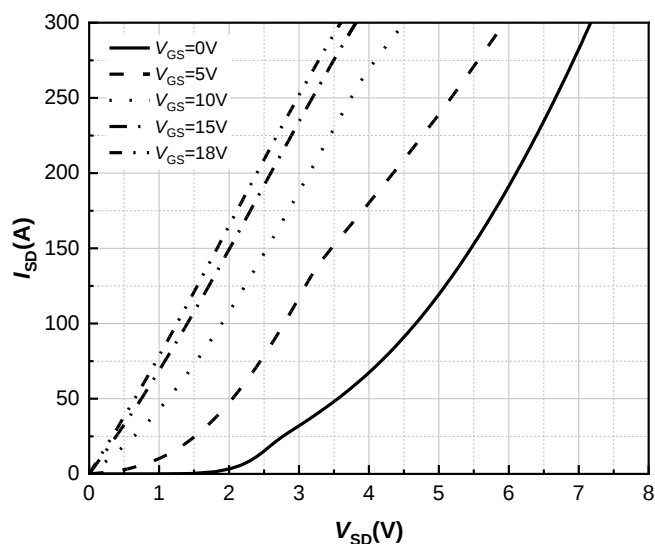


Figure 14. 3rd Quadrant Characteristic
 $T_j = 25^\circ\text{C}$

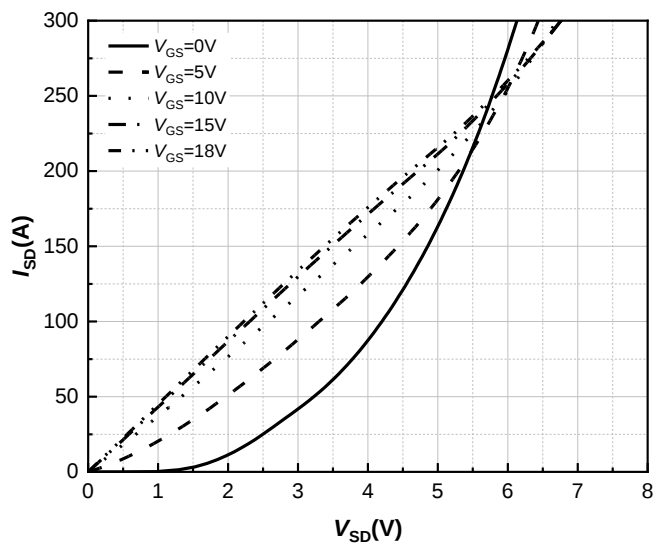


Figure 15. 3rd Quadrant Characteristic
 $T_j = 175^\circ\text{C}$

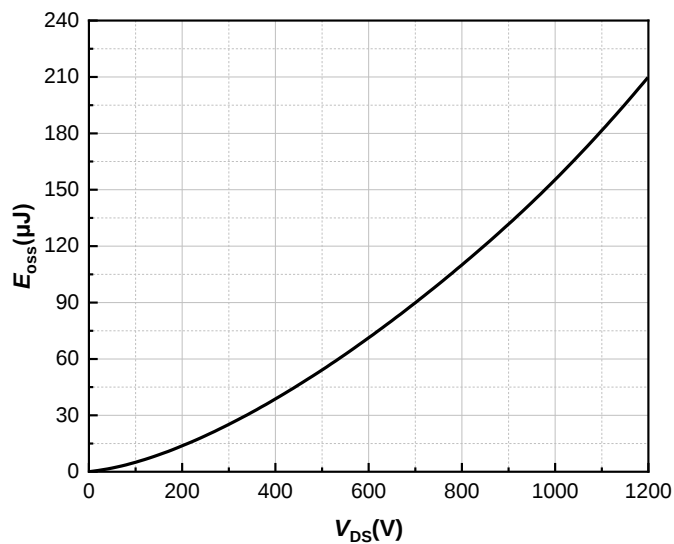
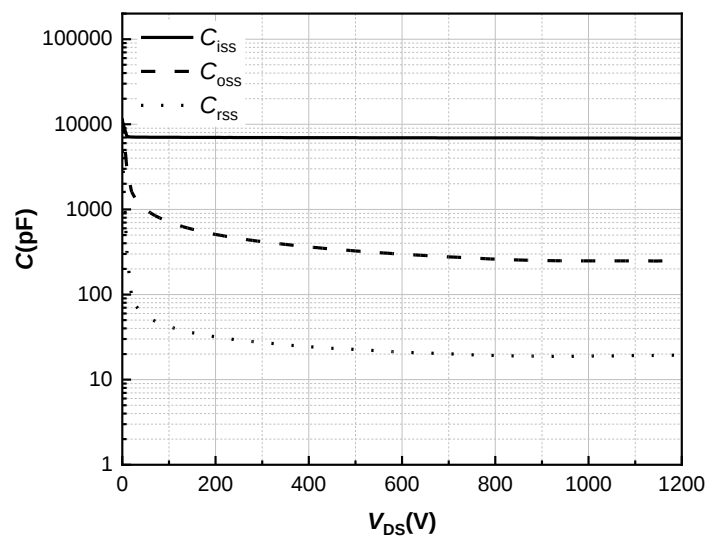


Figure 16. Output Capacitor Stored Energy

Typical PerformanceFigure 17. **Capacitances vs. Drain-Source**