

GC2M023170S

Silicon Carbide Power MOSFET N-Channel Enhancement Mode

V_{DS}	=	1700	V
$R_{DS(on)}$	=	23	m
$I_{D@25^{\circ}C}$	=	140	A

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitance
- Easy to Parallel and Simple to Drive
- Avalanche Ruggedness

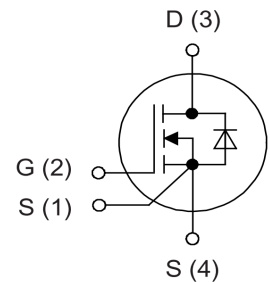
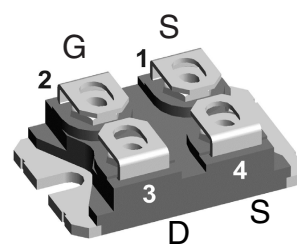
Benefits

- Higher System Efficiency
- Reduced Cooling Requirements
- Increased Power Density
- Increased System Switching Frequency

Applications

- Power Supplies
- High Voltage DC/DC Converters
- Motor Drives
- Switch Mode Power Supplies
- Pulsed Power applications

Package



Part Number	Package
GC2M023170S	SOT-227

Maximum Ratings ($T_c=25^{\circ}C$ unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain-Source Voltage	1700	V	$V_{GS}=0V, I_D=200\mu A$	
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	140	A	$V_{GS}=20V, T_c=25^{\circ}C$	
		100		$V_{GS}=20V, T_c=100^{\circ}C$	
$I_{D(pulse)}$	Pulsed Drain Current	320	A	Pulse width t_p limited by T_{Jmax}	
T_J, T_{STG}	Operating Junction and Storage Temperature	-40 to +150	$^{\circ}C$		
T_{Proc}	Maximum Processing Temperature	325	$^{\circ}C$	10 min, maximum	

Assumes a $R_{\theta JC} < 0.27^{\circ}C/W$

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

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	Note
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	1700	/	/	V	$V_{GS}=0V, I_D=200\mu A$	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.6	4.0	V	$V_{DS}=V_{GS}, I_D=36mA$	
		/	1.8	/		$V_{DS}=V_{GS}, I_D=36mA, T_J=150^\circ\text{C}$	
I_{DSS}	Zero Gate Voltage Drain Current	/	2	200	μA	$V_{DS}=1700V, V_{GS}=0V$	
I_{GSS}	Gate-Source Leakage Current	/	/	500	nA	$V_{DS}=0V, V_{GS}=20V$	
$R_{DS(on)}$	Drain-Source On-State Resistance	/	23	35	m Ω	$V_{GS}=20V, I_D=100A$	
		/	45	/		$V_{GS}=20V, I_D=100A, T_J=150^\circ\text{C}$	
g_{fs}	Transconductance	/	50	/		$V_{DS}=20V, I_D=100A$	
		/	54	/	$V_{DS}=20V, I_D=100A, T_J=150^\circ\text{C}$		
C_{iss}	Input Capacitance	/	7100	/	pF	$V_{GS}=0V$	
C_{oss}	Output Capacitance	/	330	/		$V_{DS}=1000V$	
C_{rss}	Reverse Transfer Capacitance	/	12	/		f=1MHz	
E_{oss}	C_{oss} Stored Energy	/	202	/		$V_{AC}=25mV$	
E_{ON}	Turn-On Switching Energy	/	188	/	μJ	$V_{DS}=1200V, V_{GS}=-5V/20V$	
E_{OFF}	Turn-Off Switching Energy	/	652	/		$I_D=60A, R_g=2.5\Omega, L=200\mu H$	
$t_{d(on)}$	Turn-On Delay Time	/	40	/	ns	$V_{DS}=1200V, V_{GS}=-5V/20V, I_D=60A$ $R_g=2.5\Omega, R_L=2.5\Omega$	
t_r	Rise Time	/	62	/			
$t_{d(off)}$	Turn-Off Delay Time	/	66	/			
t_f	Fall Time	/	20	/			
R_G	Internal Gate Resistance	/	1.3	/	Ω	f=1MHz, open drain	
Q_{GS}	Gate to Source Charge	/	100	/	nC	$V_{DS}=1200V$	
Q_{GD}	Gate to Drain Charge	/	50	/		$V_{GS}=-5V/20V$	
Q_G	Total Gate Charge	/	400	/		$I_D=100A$	

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	3.6	/	V	$V_{GS}=-5V, I_F=50A$	
		3.3	/		$V_{GS}=-5V, I_F=50A, T_J=150^\circ\text{C}$	
I_S	Continuous Diode Forward Current	/	140	A	$T_c=25^\circ\text{C}$	
t_{rr}	Reverse Recover Time	85	/	ns	$V_{GS}=-5V, I_{SD}=50A, V_R=800V$	
Q_{rr}	Reverse Recovery Charge	420	/	nC		
I_{rrm}	Peak Reverse Recovery Current	13	/	A		

Typical Performance(per leg)

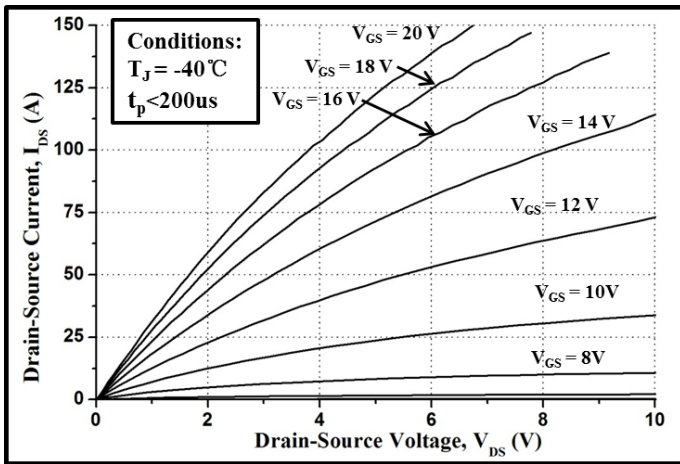


Figure 1. Output Characteristics $T_J = -40\text{ }^\circ\text{C}$

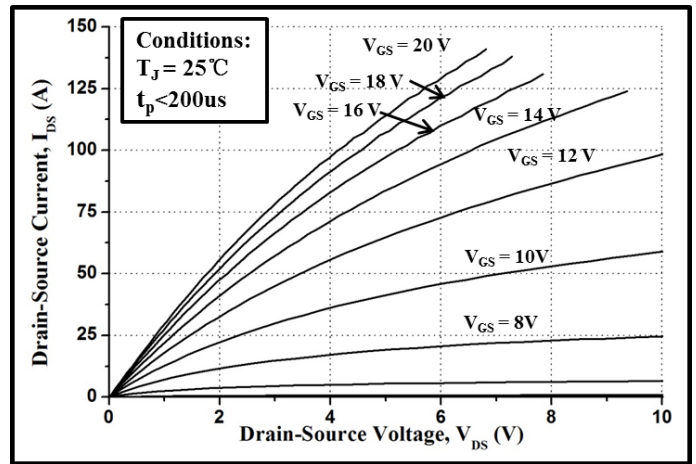


Figure 2. Output Characteristics $T_J = 25\text{ }^\circ\text{C}$

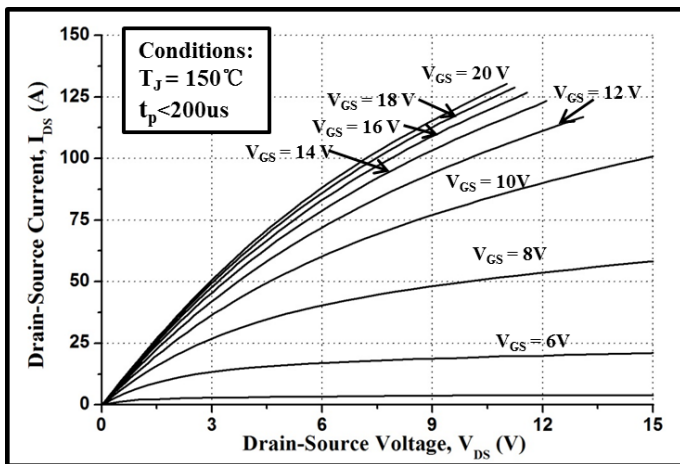


Figure 3. Output Characteristics $T_J = 150\text{ }^\circ\text{C}$

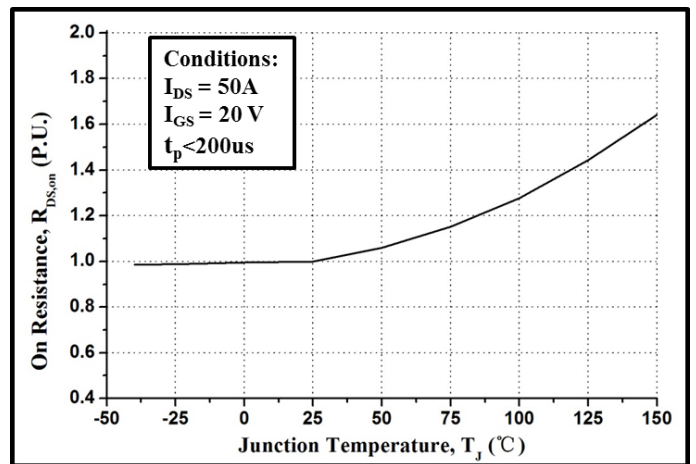


Figure 4. Normalized On-Resistance vs. Temperature

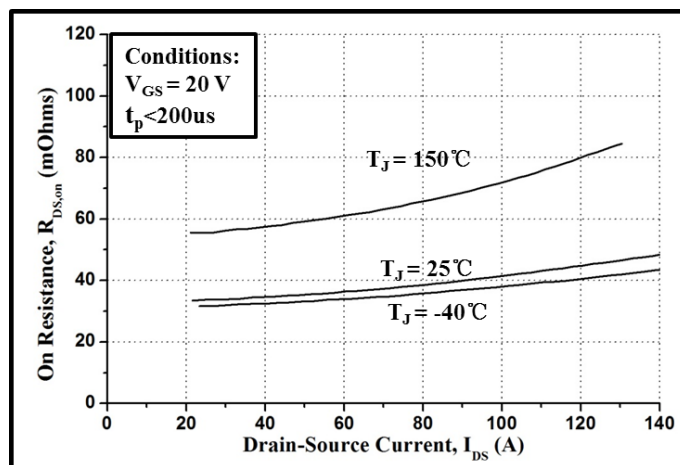


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

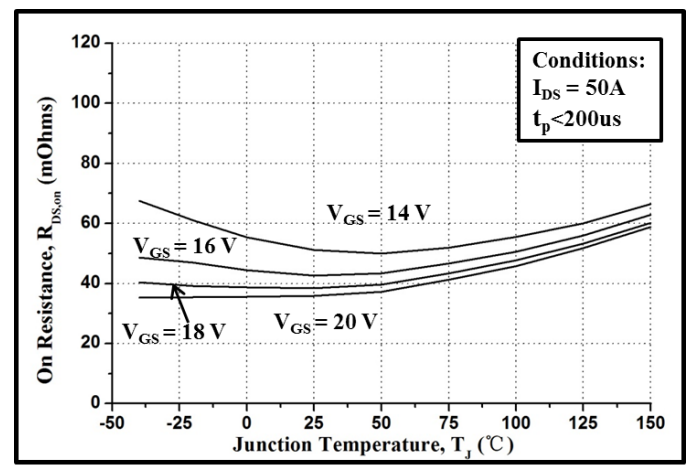


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

Typical Performance(per leg)

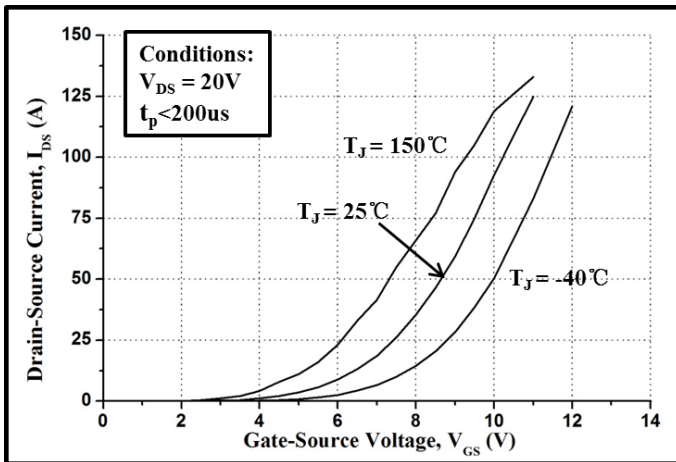


Figure 7. Transfer Characteristic for Various Junction Temperatures

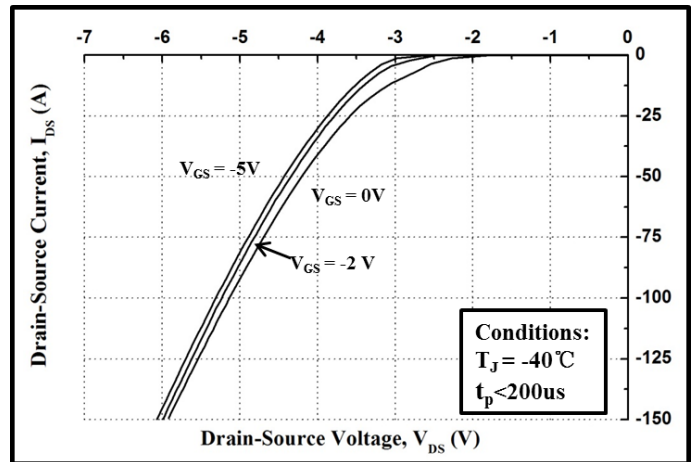


Figure 8. Body Diode Characteristic at -40°C

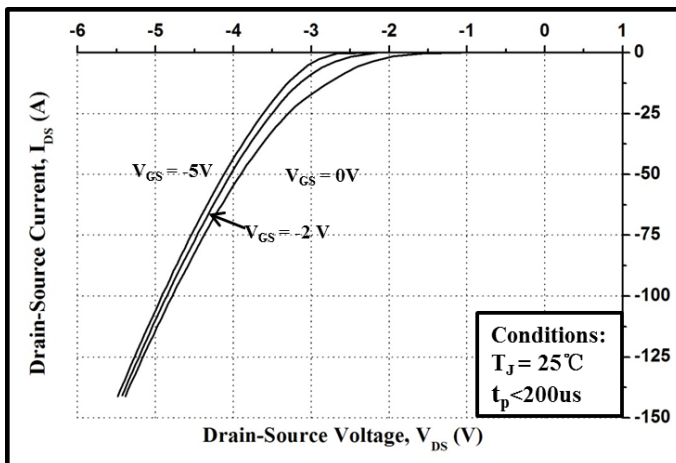


Figure 9. Body Diode Characteristic at 25°C

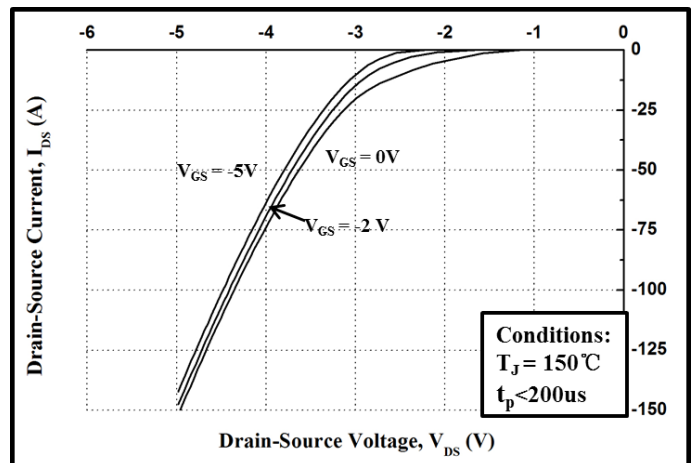


Figure 10. Body Diode Characteristic at 150°C

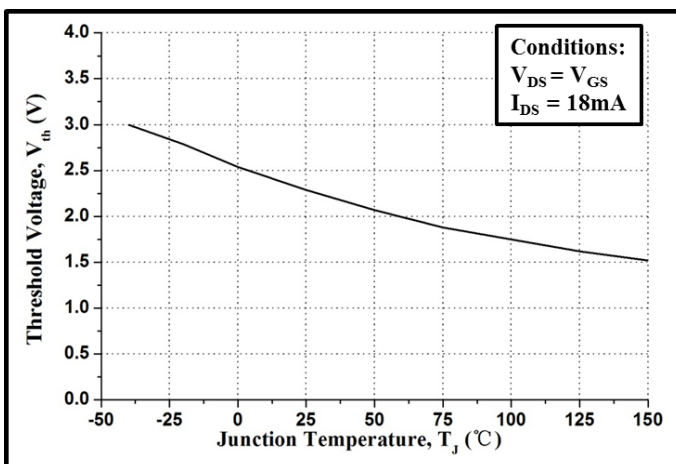


Figure 11. Threshold Voltage vs. Temperature

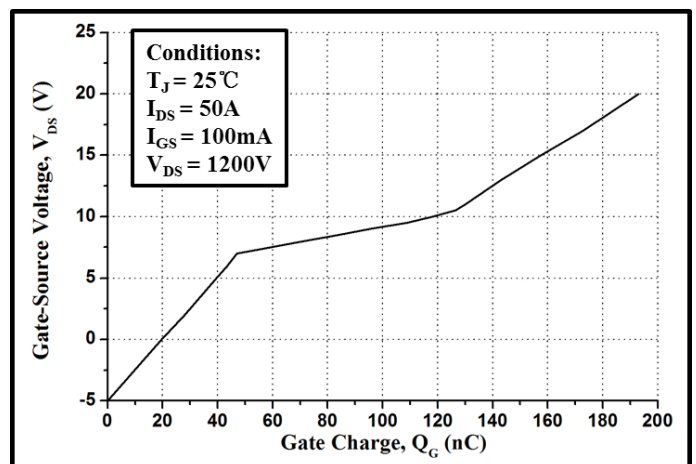


Figure 12. Gate Charge Characteristic

Typical Performance(per leg)

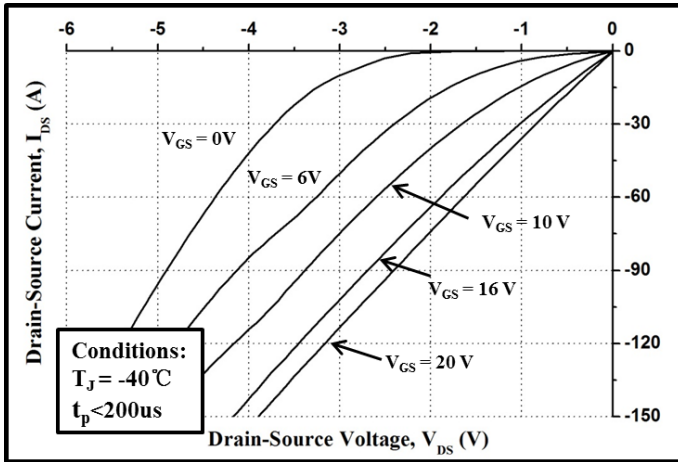


Figure 13. 3rd Quadrant Characteristic at -40 °C

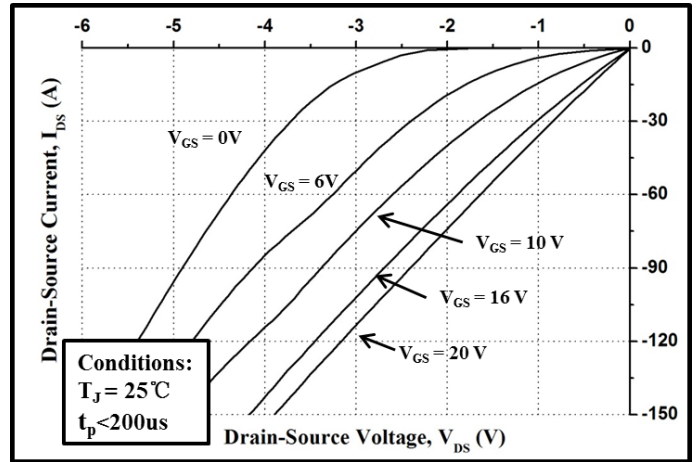


Figure 14. 3rd Quadrant Characteristic at 25 °C

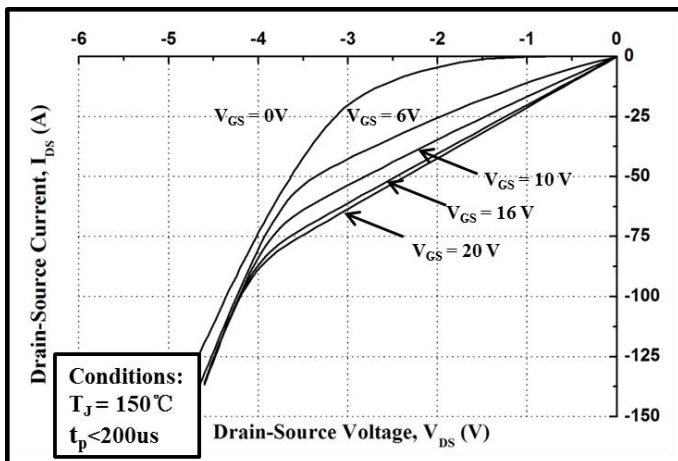


Figure 15. 3rd Quadrant Characteristic at 150 °C

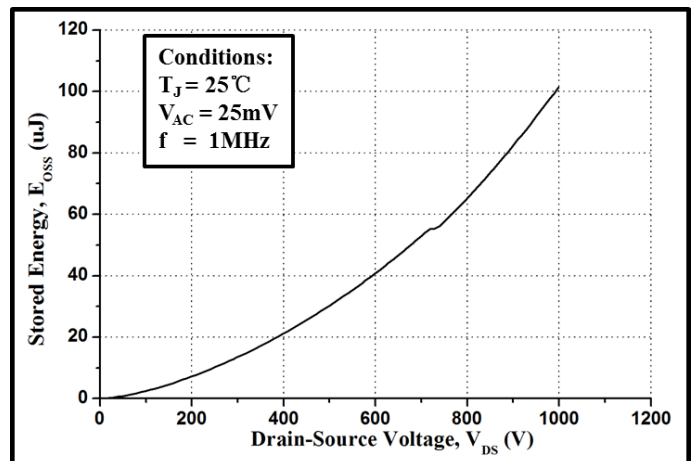


Figure 16. Output Capacitor Stored Energy

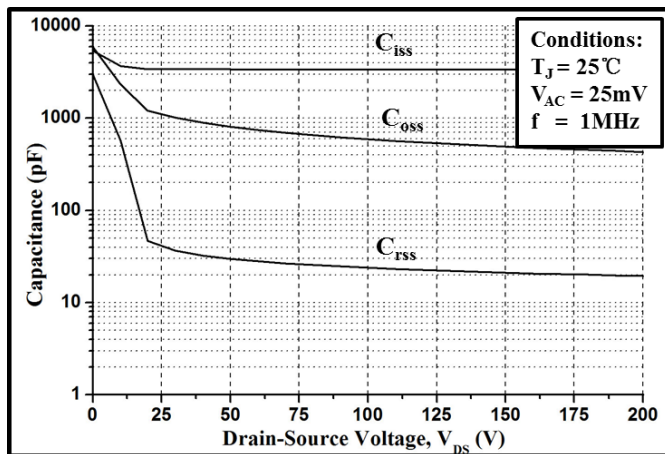


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

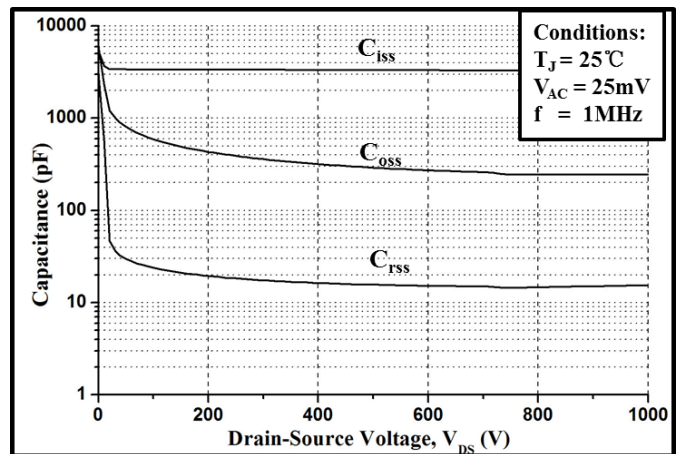
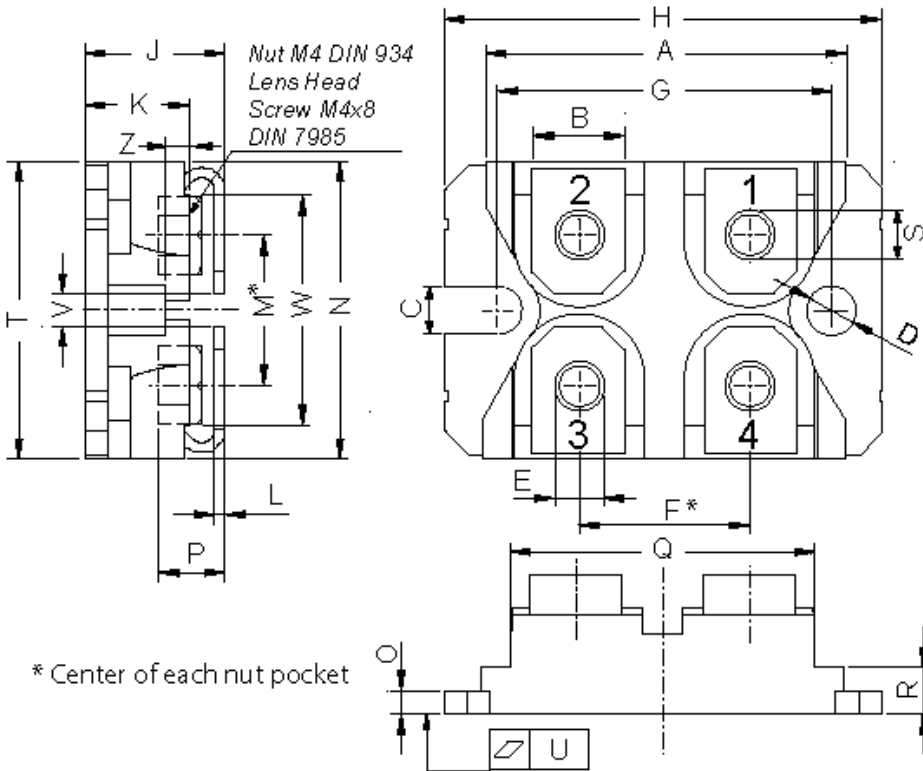


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1000V)

Package Dimensions: SOT-227



Dim.	Millimeter		Inches	
	min	max	min	max
A	31.50	31.88	1.240	1.255
B	7.80	8.20	0.307	0.323
C	4.09	4.29	0.161	0.169
D	4.09	4.29	0.161	0.169
E	4.09	4.29	0.161	0.169
F	14.91	15.11	0.587	0.595
G	30.12	30.30	1.186	1.193
H	37.80	38.23	1.488	1.505
J	11.68	12.22	0.460	0.481
K	8.92	9.60	0.351	0.378
L	0.74	0.84	0.029	0.033
M	12.50	13.10	0.492	0.516
N	25.15	25.42	0.990	1.001
O	1.95	2.13	0.077	0.084
P	4.95	6.20	0.195	0.244
Q	26.54	26.90	1.045	1.059
R	3.94	4.42	0.155	0.167
S	4.55	4.85	0.179	0.191
T	24.59	25.25	0.968	0.994
U	-0.05	0.10	-0.002	0.004
V	3.20	5.50	0.126	0.217
W	19.81	21.08	0.780	0.830
Z	2.50	2.70	0.098	0.106

