WM1A080120K1

N-Channel SiC Power MOSFET

V_{DS}	=	1200 V
$R_{DS(on)}$	=	80 mΩ
I_D@25℃	=	36 A

Features

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

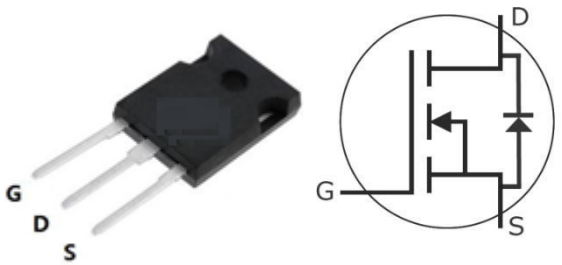
Benefits

- 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
WM1A080120K1	TO-247-3

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

Symbol	Parameter	Value	Unit	Test Conditions	Note
V_{DSmax}	Drain-Source Voltage	1200	V	V_{GS}=0V, I_D=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	36	A	V_{GS}=20V, T_c=25°C	
		24		V_{GS}=20V, T_c=100°C	
$I_{D(pulse)}$	Pulsed Drain Current	80	A	Pulse width t_p limited by T_{Jmax}	
P_D	Power Dissipation	192	W	T_c=25°C, T_J=150°C	
T_J, T_{STG}	Operating Junction and Storage Temperature	-55 to +175	℃		

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	1200			V	V_{GS}=0V, I_D=100μA	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.4	4.0	V	V_{DS}=V_{GS}, I_D=5mA	
			1.8			V_{DS}=V_{GS}, I_D=5mA, T_J=150°C	
I_{DSS}	Zero Gate Voltage Drain Current		1	100	μA	V_{DS}=1200V, V_{GS}=0V	
I_{GSS+}	Gate-Source Leakage Current		10	250	nA	V_{DS}=0V, V_{GS}=25V	
I_{GSS-}	Gate-Source Leakage Current		10	250	nA	V_{DS}=0V, V_{GS}=-10V	
$R_{DS(on)}$	Drain-Source On-State Resistance		80	98	mΩ	V_{GS}=20V, I_D=20A	
			140			V_{GS}=20V, I_D=20A, T_J=150°C	
C_{iss}	Input Capacitance		1475		pF	V_{GS}=0V V_{DS}=1000V f=1MHz V_{AC}=25mV	
C_{oss}	Output Capacitance		94				
C_{rss}	Reverse Transfer Capacitance		11				
E_{oss}	C_{oss} Stored Energy		52		μJ		
E_{ON}	Turn-On Switching Energy		564		μJ	V_{DS}=800V, V_{GS}=-5V/20V I_D=20A, $R_{G(ext)}$=2.5Ω, L=200μH	
E_{OFF}	Turn-Off Switching Energy		260				
$t_{d(on)}$	Turn-On Delay Time		9.3		ns	V_{DS}=800V, V_{GS}=-5V/20V, I_D=20A $R_{G(ext)}$=2.5Ω, R_L=40Ω	
t_r	Rise Time		9.5				
$t_{d(off)}$	Turn-Off Delay Time		18				
t_f	Fall Time		7.6				
$R_{G(int)}$	Internal Gate Resistance		3.1		Ω	f=1MHz, V_{AC}=25mV	
Q_{GS}	Gate to Source Charge		24		nC	V_{DS}=800V V_{GS}=-5V/20V I_D=20A	
Q_{GD}	Gate to Drain Charge		15				
Q_G	Total Gate Charge		79				

Reverse Diode Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
V_{SD}	Diode Forward Voltage	3.6		V	V_{GS}=-5V, I_{SD}=10A	
		3.3			V_{GS}=-5V, I_{SD}=10A, T_J=150°C	
I_S	Continuous Diode Forward Current		44	A	T_C=25°C	
t_{rr}	Reverse Recover Time	35		ns	V_R=800V, I_{SD}=20A dif/dt=290A/μs	
Q_{rr}	Reverse Recovery Charge	91		nC		
I_{rrm}	Peak Reverse Recovery Current	4.5		A		

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$R_{θJC}$	Thermal Resistance from Junction to Case	0.65		°C/W		
$R_{θJA}$	Thermal Resistance from Junction to Ambient		40			

Typical Performance

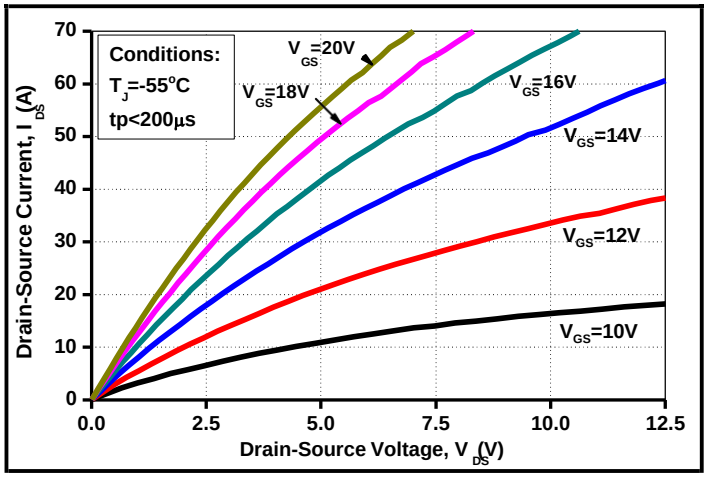


Figure 1. Output Characteristics T_J = -55 ℃

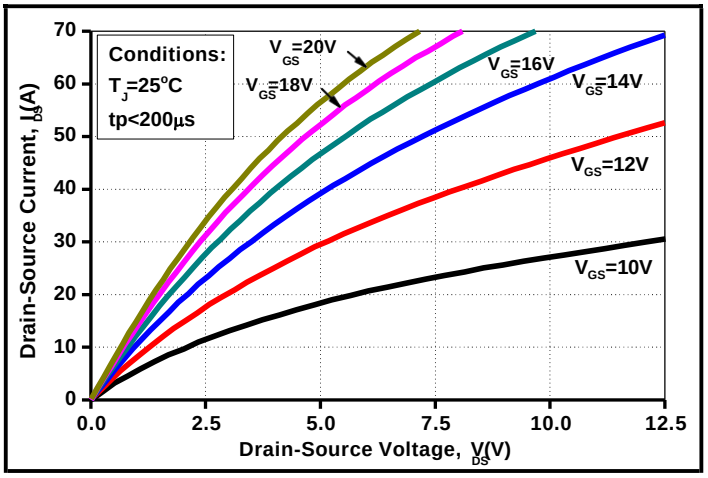


Figure 2. Output Characteristics T_J = 25 ℃

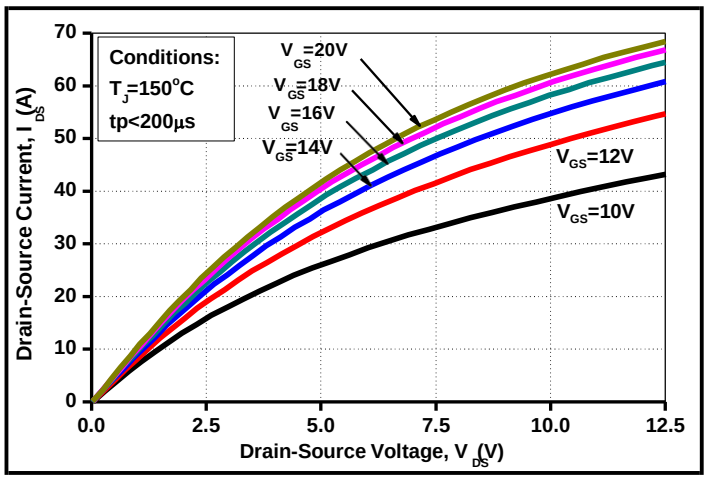


Figure 3. Output Characteristics T_J = 150 ℃

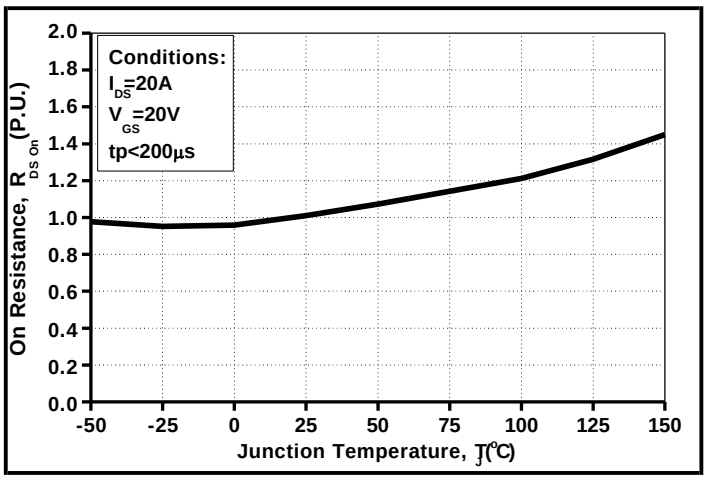


Figure 4. Normalized On-Resistance vs. Temperature

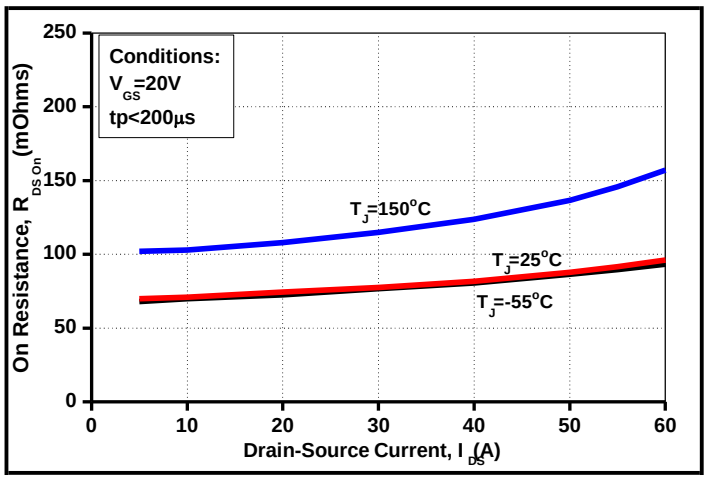


Figure 5. On-Resistance vs. Drain Current
For Various Temperatures

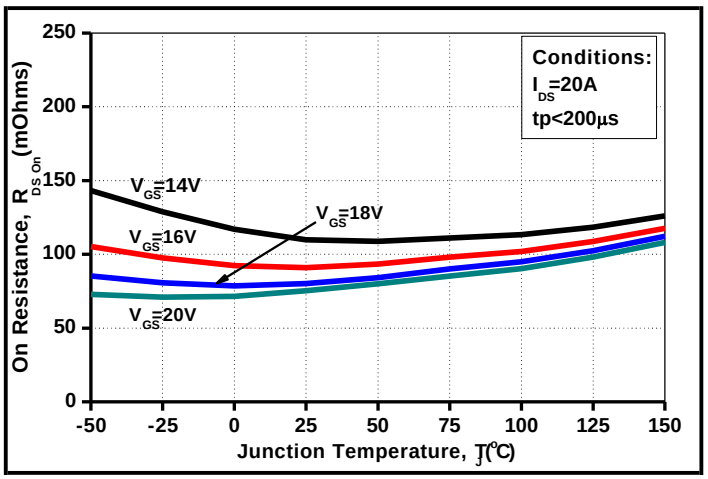


Figure 6. On-Resistance vs. Temperature
For Various Gate Voltage

Typical Performance

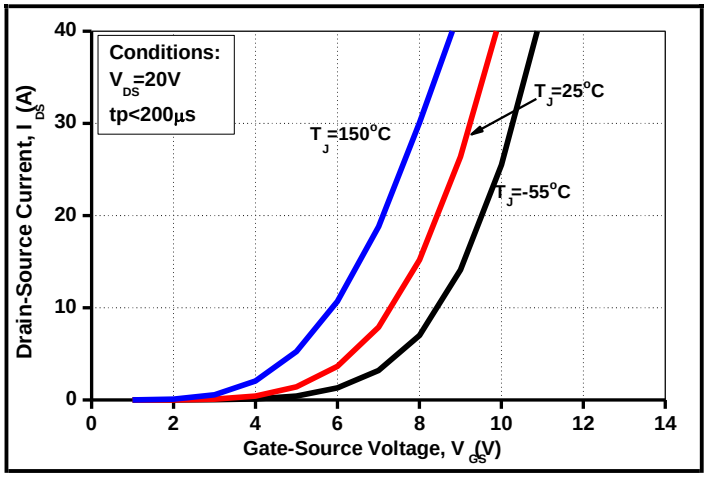


Figure 7. Transfer Characteristic for Various Junction Temperatures

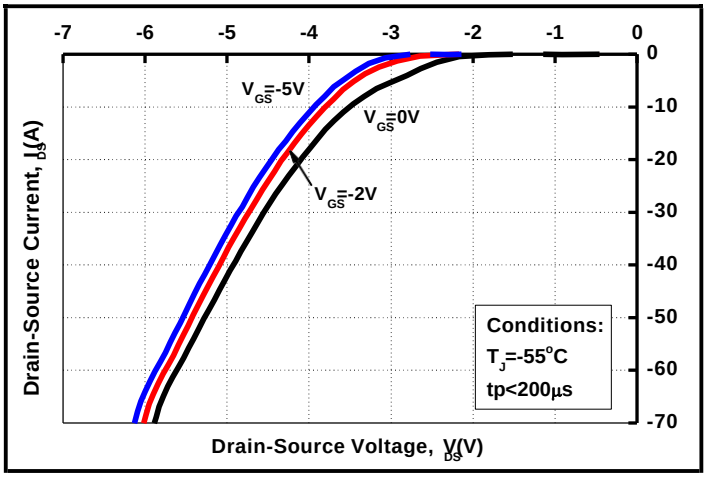


Figure 8. Body Diode Characteristic at -55 ℃

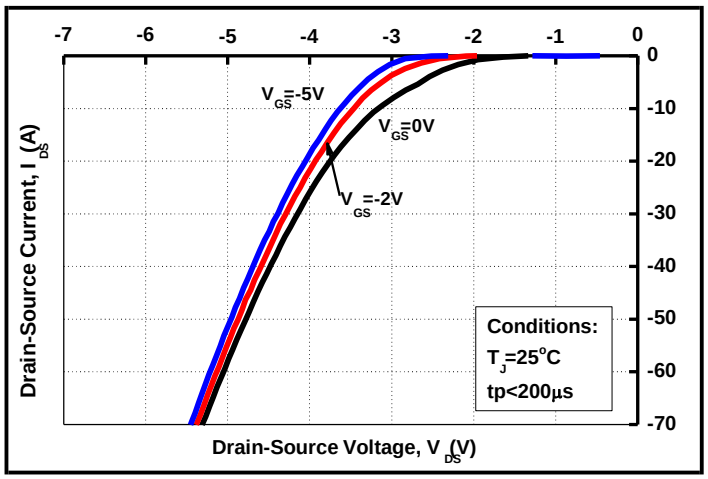


Figure 9. Body Diode Characteristic at 25 ℃

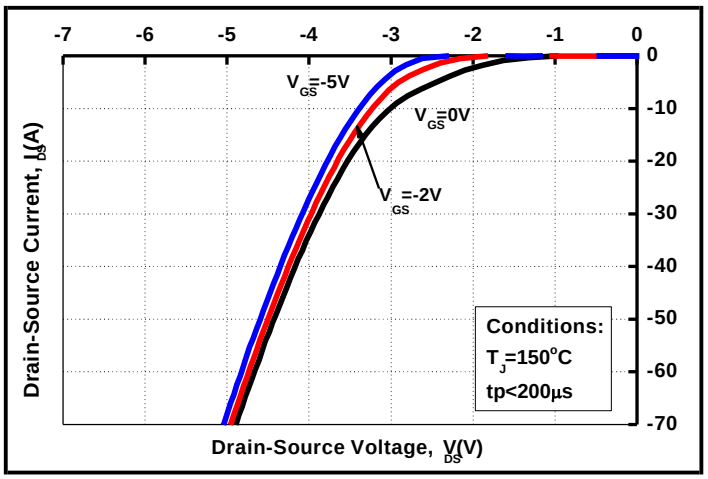


Figure 10. Body Diode Characteristic at 150 ℃

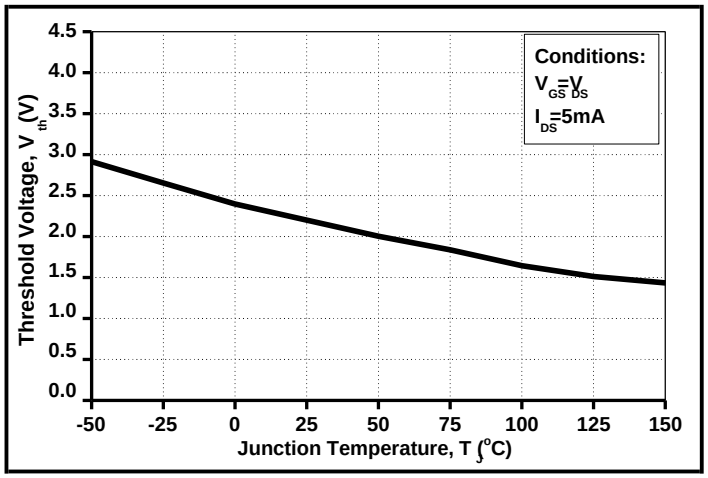


Figure 11. Threshold Voltage vs. Temperature

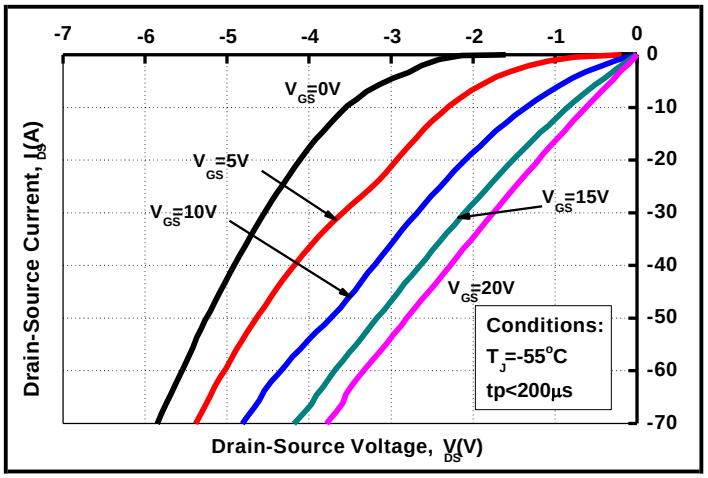


Figure 12. 3rd Quadrant Characteristic at -55 ℃

Typical Performance

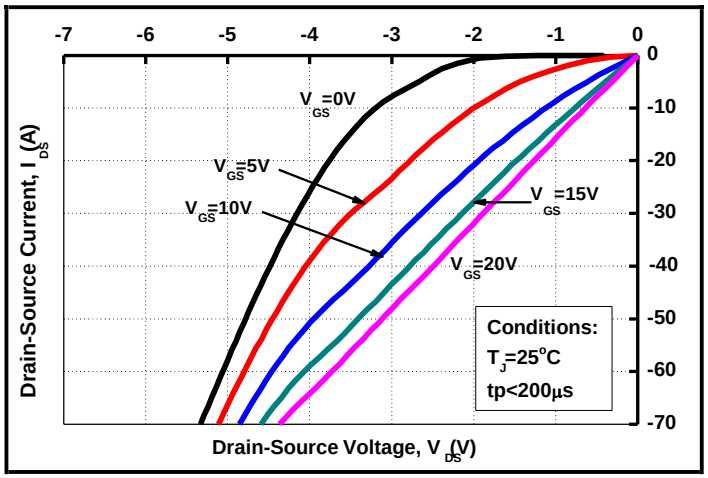


Figure 13. 3rd Quadrant Characteristic at 25 ℃

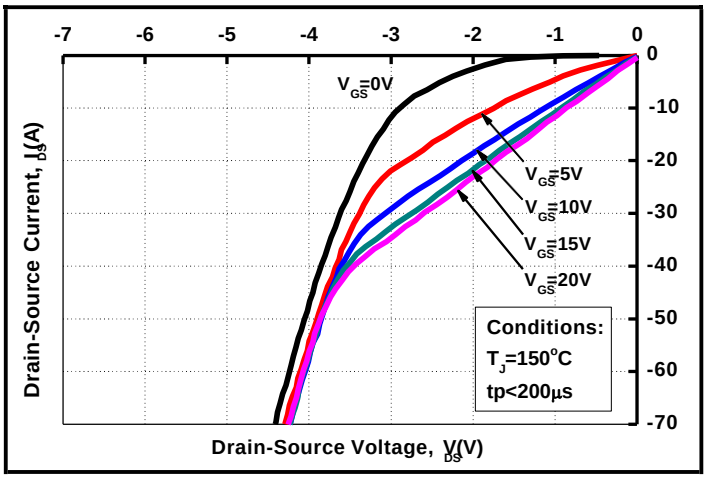


Figure 14. 3rd Quadrant Characteristic at 150 ℃

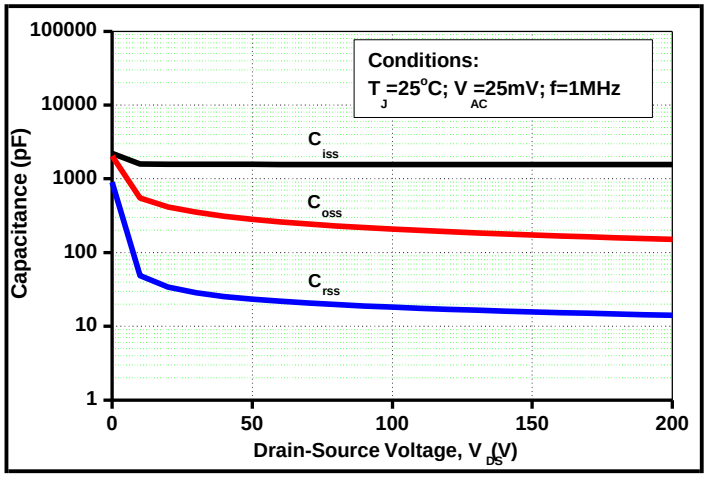


Figure 15. Capacitances vs. Drain-Source Voltage (0 - 200V)

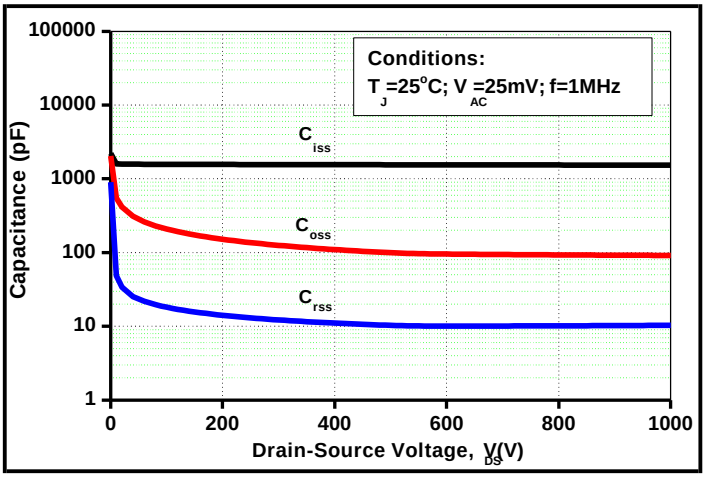
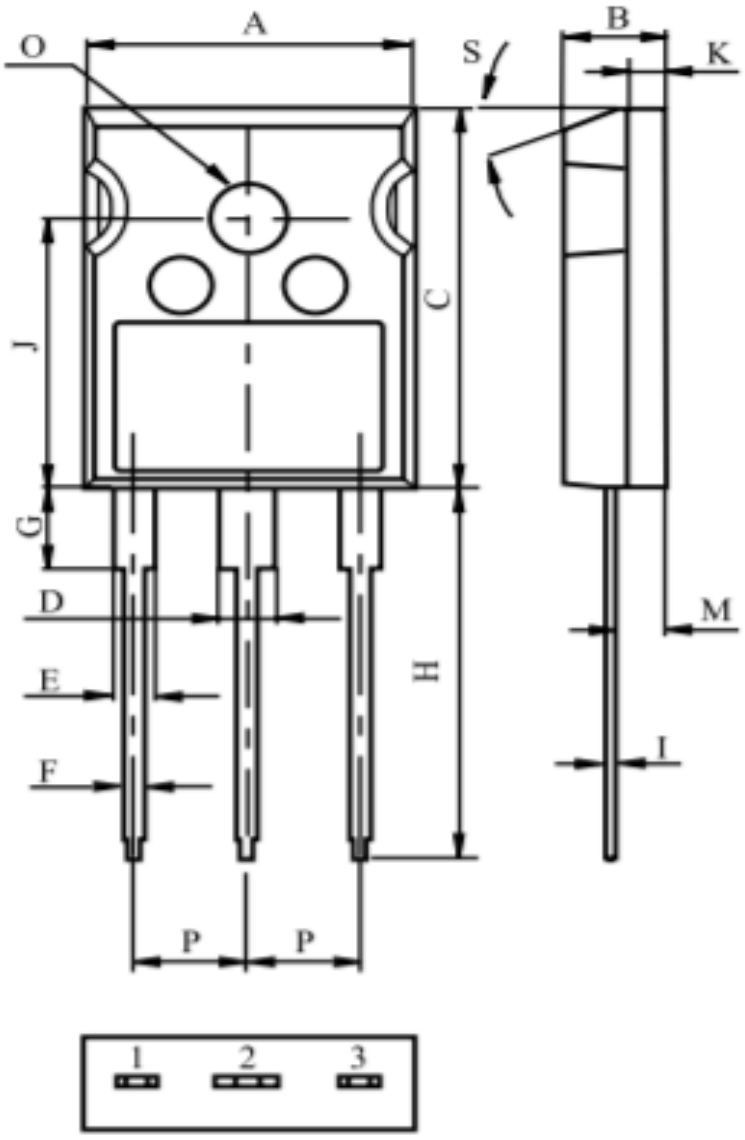


Figure 16. Capacitances vs. Drain-Source Voltage (0 - 1000V)

Package Dimensions

Package TO-247-3



DIM	MILLIMETERS
A	15.90 ± 0.30
B	5.00 ± 0.20
C	20.85 ± 0.30
D	3.00 ± 0.20
E	2.00 ± 0.20
F	1.20 ± 0.20
G	Max. 4.50
H	20.10 ± 0.70
I	0.60 ± 0.02
J	14.70 ± 0.20
K	2.00 ± 0.10
M	2.40 ± 0.20
O	ϕ3.60 ± 0.30
P	5.45 ± 0.30
Q	ϕ3.60 ± 0.20
R	ϕ7.19 ± 0.10
S	20°

TO-247