

P/N: YZPST-M1A080120L1

## N-Channel SiC Power MOSFET

$V_{DS}$	=	1200 V
$R_{DS(on)}$	=	80 mΩ
$I_D@25^{\circ}C$	=	36 A

### Features

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

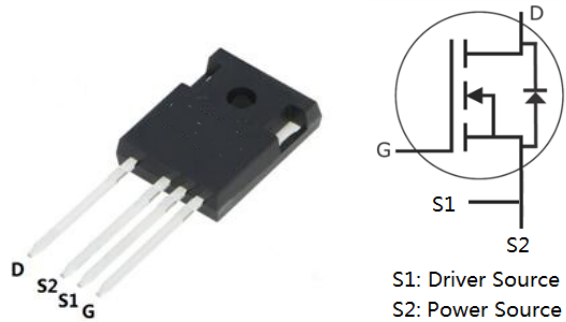
### Benefits

- 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
M1A080120 L1	TO-247-4

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

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

**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	1200	/	/	V	$V_{GS}=0V, I_D=100\mu A$	
$V_{GS(th)}$	Gate Threshold Voltage	2.0	2.4	4.0	V	$V_{DS}=V_{GS}, I_D=5mA$	Fig. 11
		/	1.8	/		$V_{DS}=V_{GS}, I_D=5mA, T_J=150^\circ\text{C}$	
$I_{DSS}$	Zero Gate Voltage Drain Current	/	1	100	$\mu A$	$V_{DS}=1200V, V_{GS}=0V$	
$I_{GSS+}$	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	m $\Omega$	$V_{GS}=20V, I_D=20A$	Fig. 4,5,6
		/	140	/		$V_{GS}=20V, I_D=20A, T_J=150^\circ\text{C}$	
$C_{iss}$	Input Capacitance	/	1475	/	pF	$V_{GS}=0V$	Fig. 15,16
$C_{oss}$	Output Capacitance	/	94	/		$V_{DS}=1000V$	
$C_{rss}$	Reverse Transfer Capacitance	/	11	/		$f=1MHz$	
$E_{oss}$	$C_{oss}$ Stored Energy	/	52	/	$\mu J$	$V_{AC}=25mV$	
$E_{ON}$	Turn-On Switching Energy	/	564	/	$\mu J$	$V_{DS}=800V, V_{GS}=-5V/20V$	
$E_{OFF}$	Turn-Off Switching Energy	/	260	/		$I_D=20A, R_{G(ext)}=2.5\Omega, L=200\mu H$	
$t_{d(on)}$	Turn-On Delay Time	/	9.3	/	ns	$V_{DS}=800V, V_{GS}=-5V/20V, I_D=20A$ $R_{G(ext)}=2.5\Omega, R_L=40\Omega$	
$t_r$	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	/	$\Omega$	$f=1MHz, V_{AC}=25mV$	
$Q_{GS}$	Gate to Source Charge	/	24	/	nC	$V_{DS}=800V$	
$Q_{GD}$	Gate to Drain Charge	/	15	/		$V_{GS}=-5V/20V$	
$Q_G$	Total Gate Charge	/	79	/		$I_D=20A$	

**Reverse Diode Characteristics**

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$V_{SD}$	Diode Forward Voltage	3.6	/	V	$V_{GS}=-5V, I_{SD}=10A$	Fig. 8,9,10
		3.3	/		$V_{GS}=-5V, I_{SD}=10A, T_J=150^\circ\text{C}$	
$I_S$	Continuous Diode Forward Current	/	44	A	$T_c=25^\circ\text{C}$	
$t_{rr}$	Reverse Recover Time	35	/	ns	$V_R=800V, I_{SD}=20A$	
$Q_{rr}$	Reverse Recovery Charge	91	/	nC		
$I_{rrm}$	Peak Reverse Recovery Current	4.5	/	A		

**Thermal Characteristics**

Symbol	Parameter	Typ.	Max.	Unit	Test Conditions	Note
$R_{\theta JC}$	Thermal Resistance from Junction to Case	0.6	/	$^\circ\text{C/W}$		
$R_{\theta JA}$	Thermal Resistance from Junction to Ambient	/	40			

Typical Performance

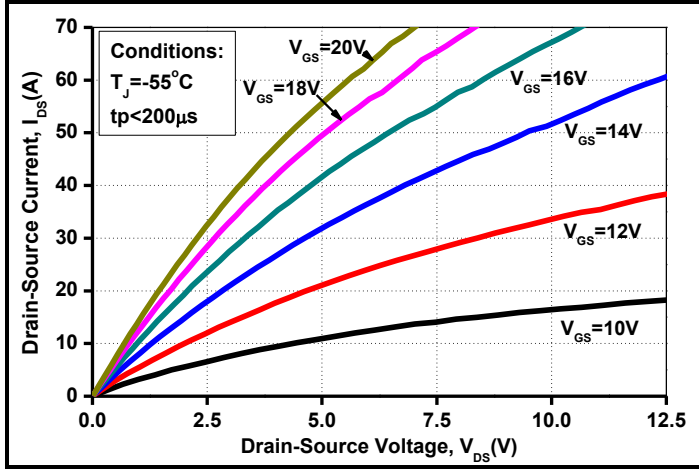


Figure 1. Output Characteristics  $T_J = -55^\circ\text{C}$

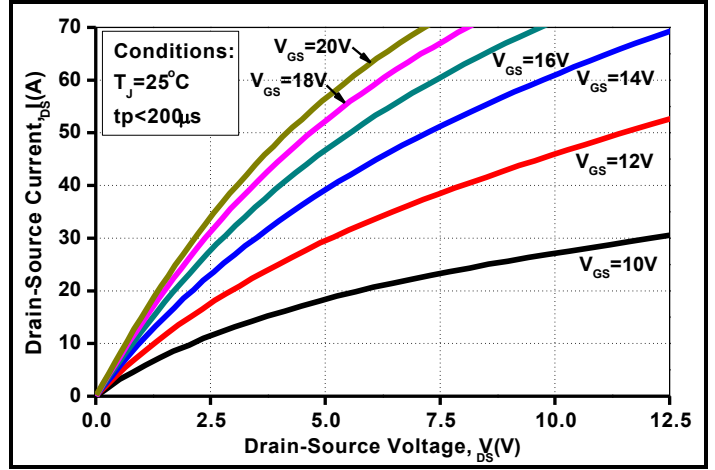


Figure 2. Output Characteristics  $T_J = 25^\circ\text{C}$

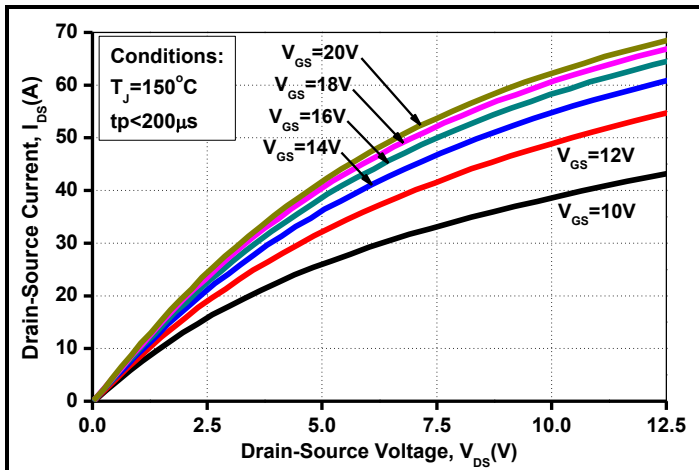


Figure 3. Output Characteristics  $T_J = 150^\circ\text{C}$

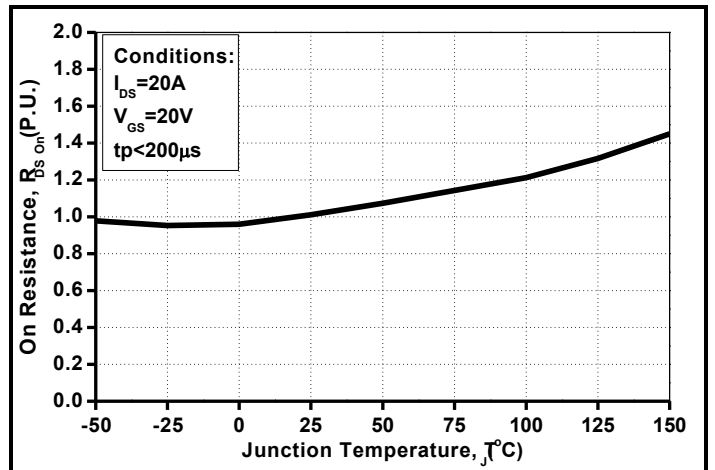


Figure 4. Normalized On-Resistance vs. Temperature

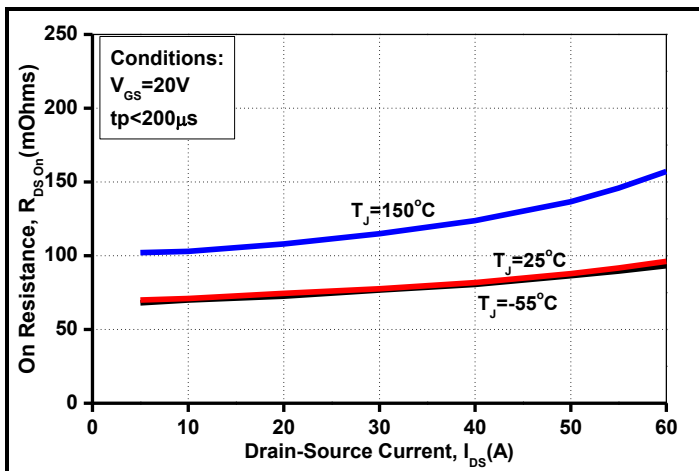


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

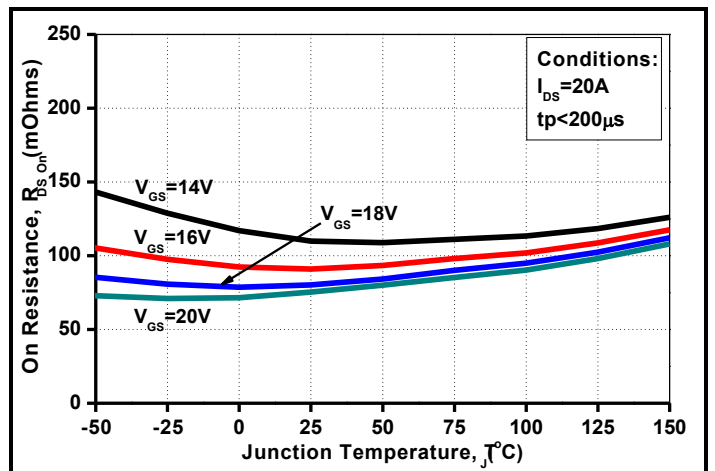


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

Typical Performance

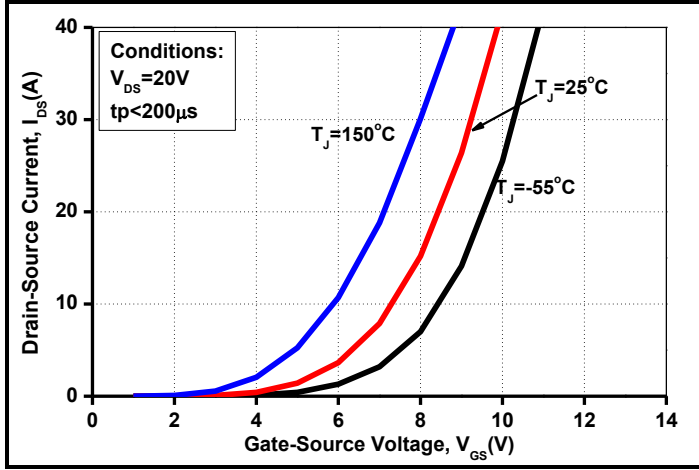


Figure 7. Transfer Characteristic for Various Junction Temperatures

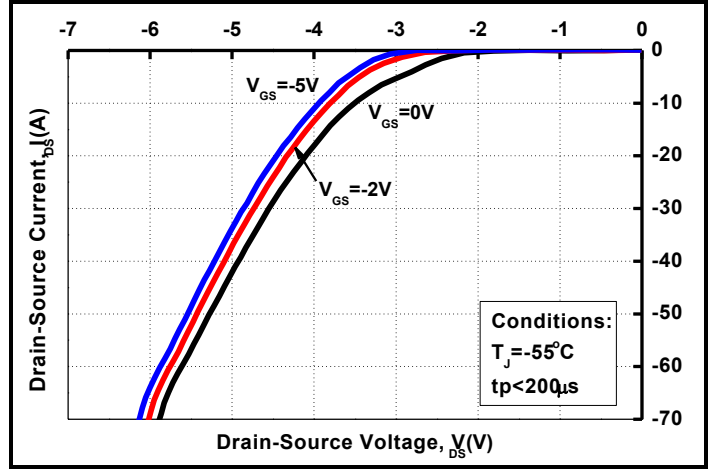


Figure 8. Body Diode Characteristic at -55 °C

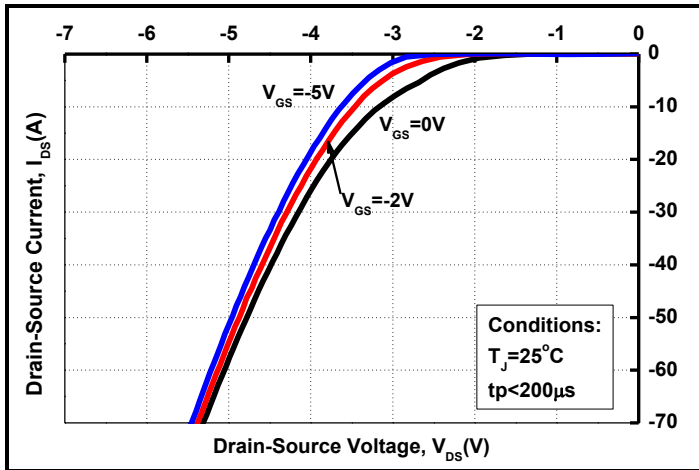


Figure 9. Body Diode Characteristic at 25 °C

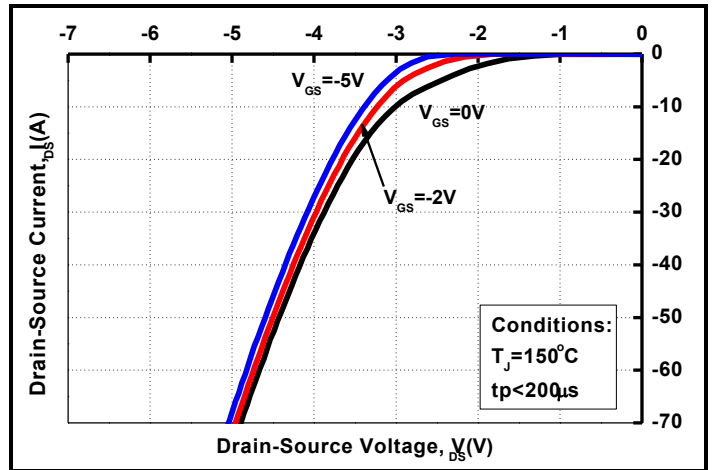


Figure 10. Body Diode Characteristic at 150 °C

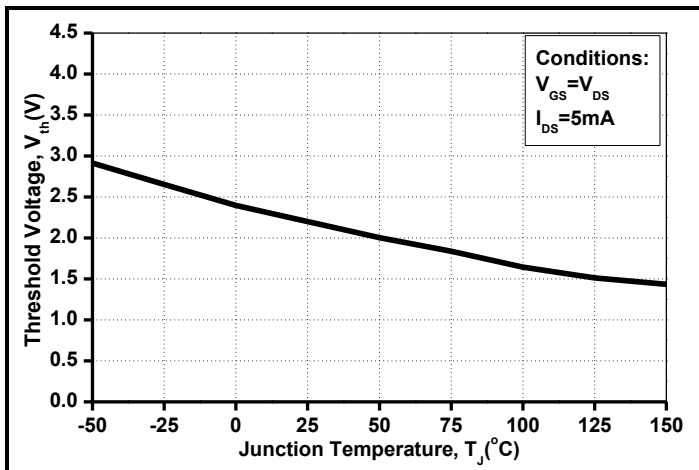


Figure 11. Threshold Voltage vs. Temperature

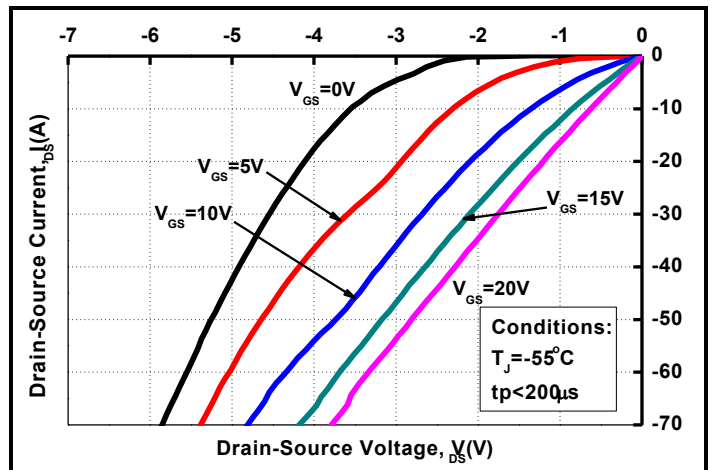


Figure 12. 3rd Quadrant Characteristic at -55 °C

Typical Performance

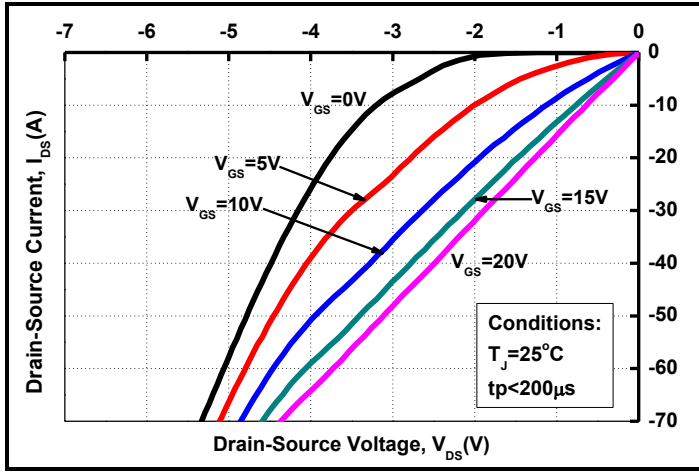


Figure 13. 3rd Quadrant Characteristic at 25 °C

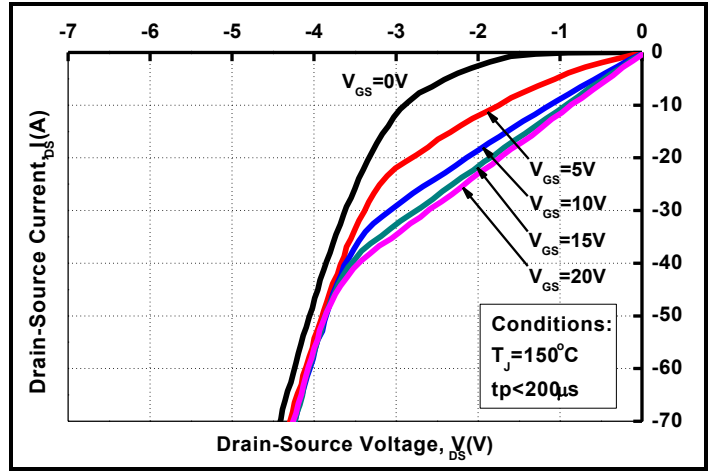


Figure 14. 3rd Quadrant Characteristic at 150 °C

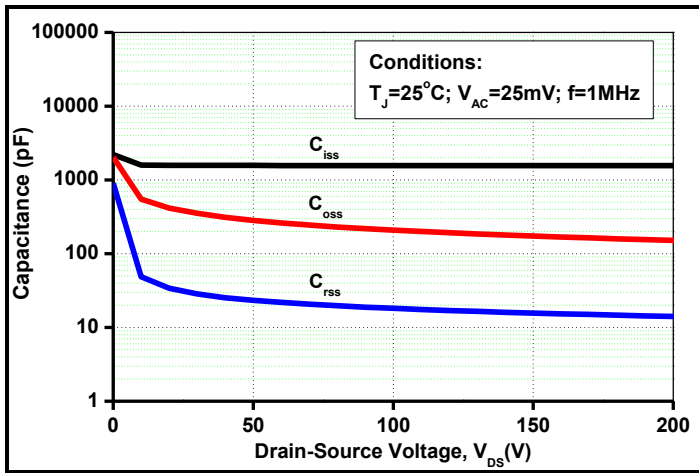


Figure 15. Capacitances vs. Drain-Source Voltage (0 - 200V)

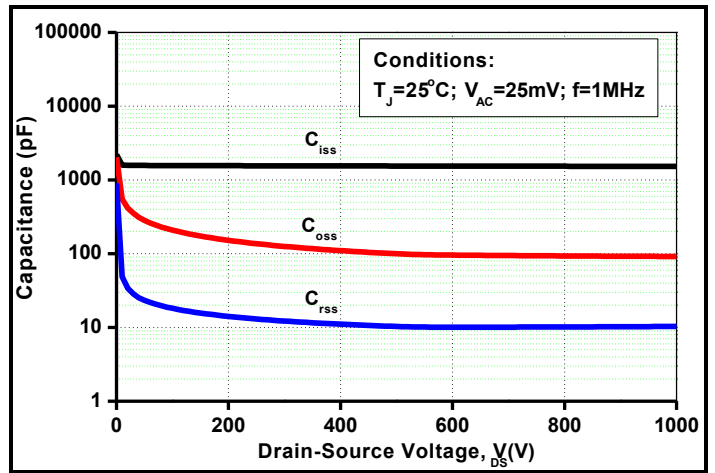
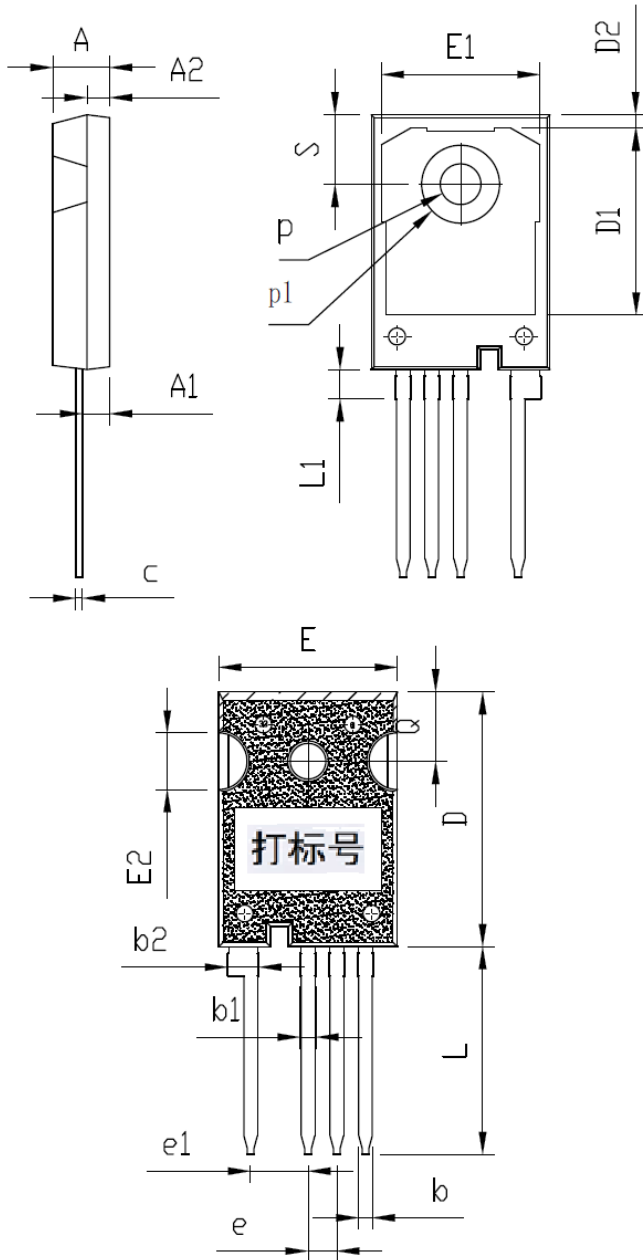


Figure 16. Capacitances vs. Drain-Source Voltage (0 - 1000V)

Package Dimensions

Package TO-247-4



SYMBOLS	DIMENSIONS IN MILLIMETERS		
	MIN	NOM	MAX
A		5.00	
A1		2.40	
A2		2.00	
b		1.20	
b1		1.30	
b2		2.65	
c		0.6	
D		22.54	
D1		16.50	
D2		1.17	
e		2.54	
e1		5.08	
E		15.80	
E1		14.00	
E2		5.00	
L		18.38	
L1		2.58	
p		3.60	
p1		6.80	
Q		6.15	
S		6.15	