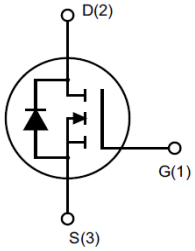
Features

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

Part NO.		MS1M040200T
V_{DS}	=	2000 V
$I_D(T_c=25℃)$	=	87 A
$R_{DS(on)}$	=	40 mΩ



Pacakge Pin definitions

- Pin1-Gate
- Pin2-Drain
- Pin3-Source

PackageParameters

Part Number	Marking	Package
MS1M040200T	MS1M040200T	TO-247-3

Maximum ratings (T_j=25℃ unless otherwise specified)

Symbol	Parameter	Test conditions	Value	Unit
V_{DS}	Drain-Source Voltage		2000	V
I_D*	Continuous Drain Current	T_c=25°C T_c=100°C	87 61	A
I_{DM}*	Peak Drain Current	Pulse width t_p limited by T_{jmax}	160	A
V_{GSmax}	Gate-Source Voltage		-8/+22	V
V_{GSop}	Recommend Gate-Source Voltage		-4/+18	V
T_j	Operating Junction Temperature		-40~150	°C
T_{stg}	Storage Temperature		-40~150	°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=100μA, V_{GS}=0V	2000			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=2000V, V_{GS}=0V		1		μA
I_{GSS}	Gate-Source Leakage Current	V_{DS}=0V, V_{GS}=18V			250	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=10mA T_j=25°C T_j=150°C	2	2.8 2.1	4	V
$R_{DS(on)}$	Drain-Source On-State Resistance	V_{GS}=18V, I_D=40A T_j=25°C T_j=150°C		40 78		mΩ

Dynamic Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
C_{iss}	Input Capacitance	V_{DS}=1200V, f=100KHz, V_{GS}=0V		3622		pF
C_{oss}	Output Capacitance			134		pF
C_{rss}	Reverse Transfer Capacitance			9.3		pF
$R_{G(int)}$	Internal Gate Resistance	f=1MHz		4.2		Ω
Q_g	Total Gate Charge	V_{DS}=1200V, I_D=40A, V_{GS}=-4/18V		166		nC
Q_{gs}	Gate to Source Charge			45		nC
Q_{gd}	Gate to Drain Charge			47		nC

Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
V_{SD}	Diode Forward Voltage	V_{GS}=-4V, I_{SD}=20A T_j=25°C T_j=150°C V_{GS}=-4V, I_{SD}=40A T_j=25°C T_j=150°C		 4.3 3.7 4.9 4.2		V
I_S	Continuous Diode Forward Current	V_{GS}=-4V T_c=25°C T_c=100°C		 87 47		A
t_{rr}	Reverse Recovery Time	V_{GS}=-4V, I_{SD}=40A, V_R=1200V, di/dt=2077A/μs		52		ns
Q_{rr}	Reverse Recovery Charge			556		nC
I_{rrm}	Peak Reverse Recovery Current			27.3		A

Typical Performance

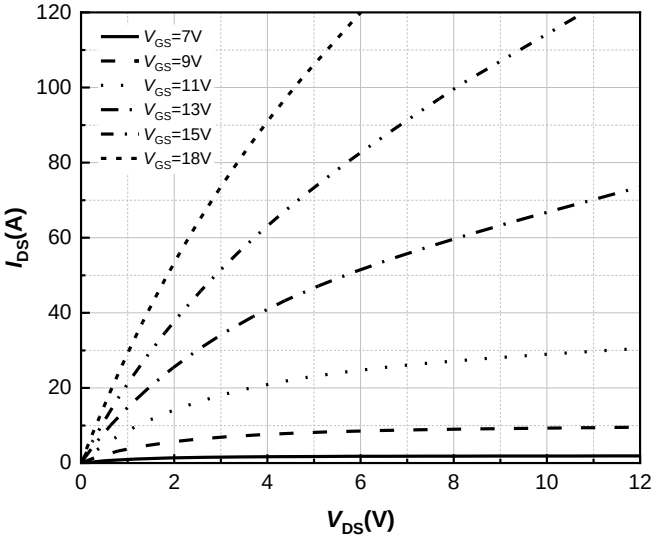


Figure 1. **Output Characteristics T_j=-40°C**

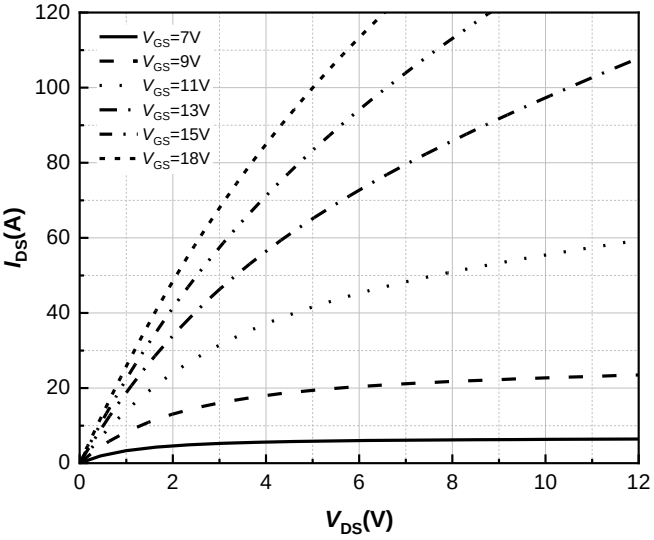


Figure 2. **Output Characteristics T_j=25°C**

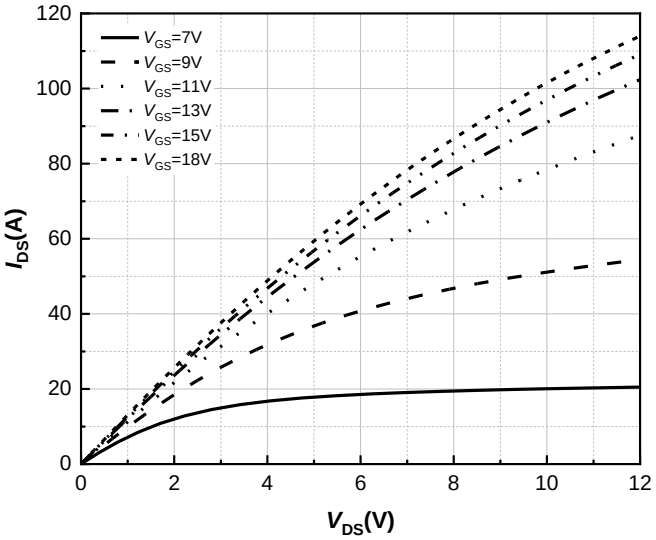


Figure 3. **Output Characteristics T_j=150°C**

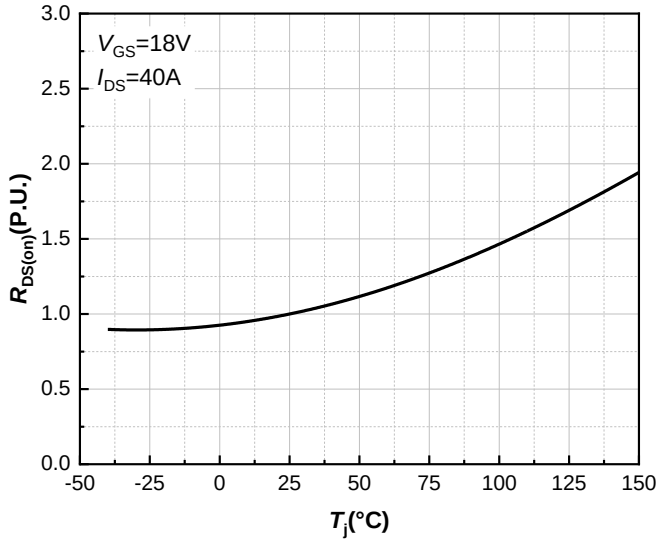


Figure 4. **Normalized On-Resistance vs. Temperature**

Typical Performance

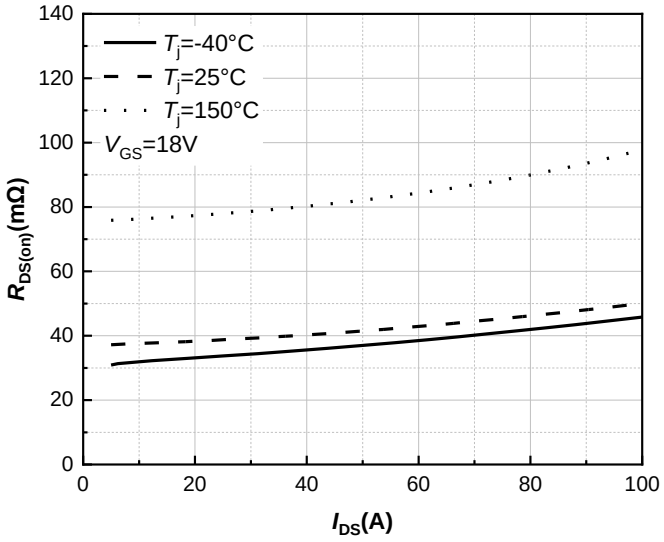


Figure 5. **On-Resistance vs. Drain Current For Various Temperatures**

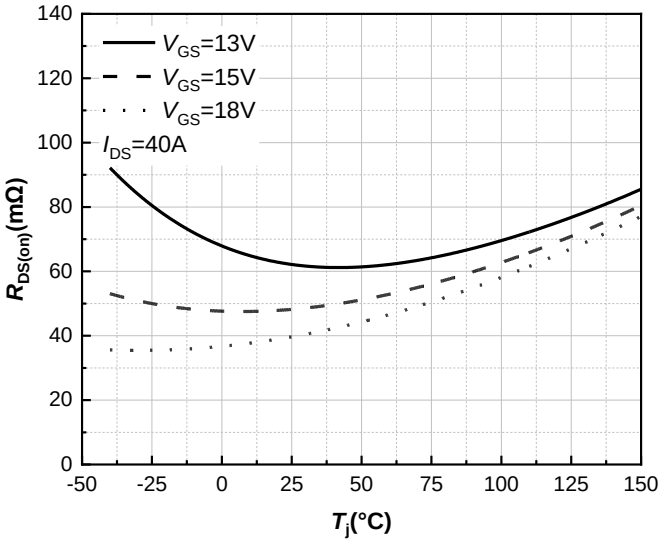


Figure 6. **On-Resistance vs. Temperature For Various Gate Voltage**

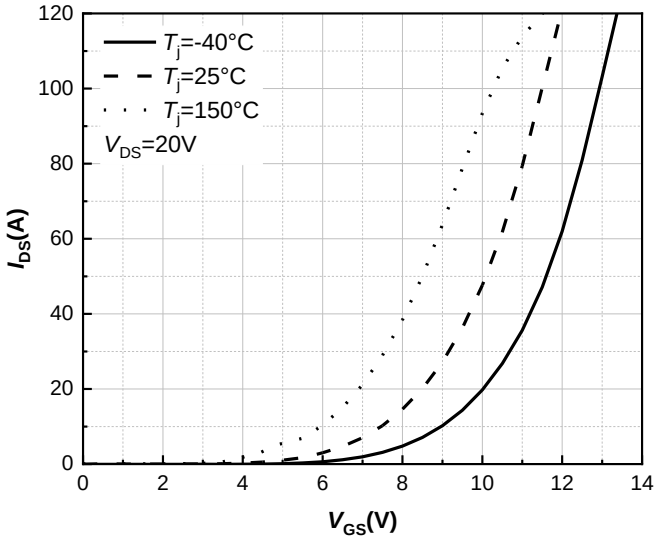


Figure 7. **Transfer Characteristic for Various Junction Temperatures V_{DS}=20V**

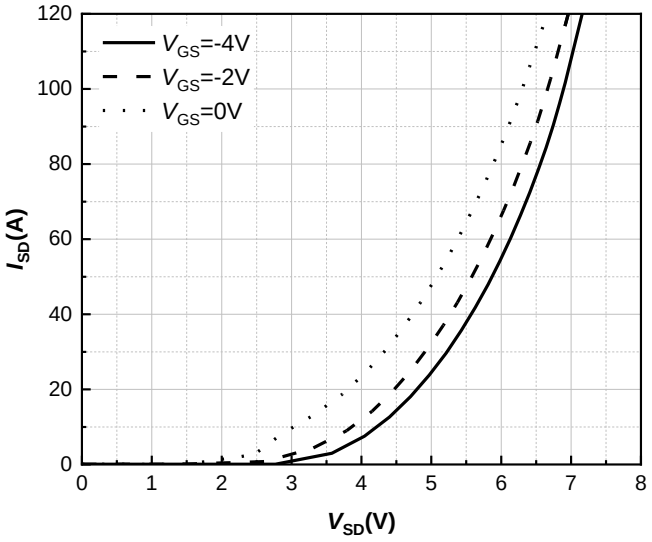


Figure 8. **Body Diode Characteristic T_j=-40°C**

Typical Performance

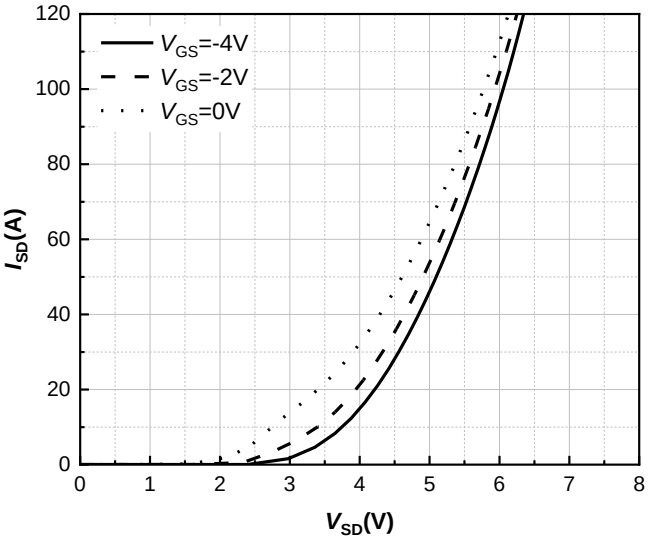


Figure 9. **Body Diode Characteristic T_j=25°C**

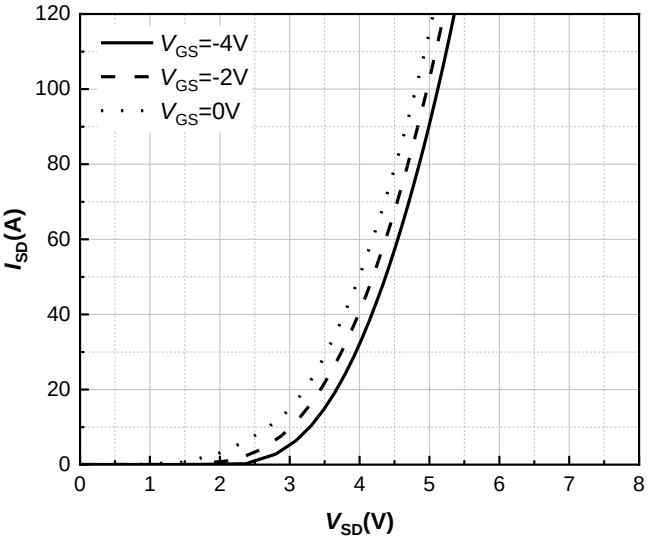


Figure 10. **Body Diode Characteristic T_j=150°C**

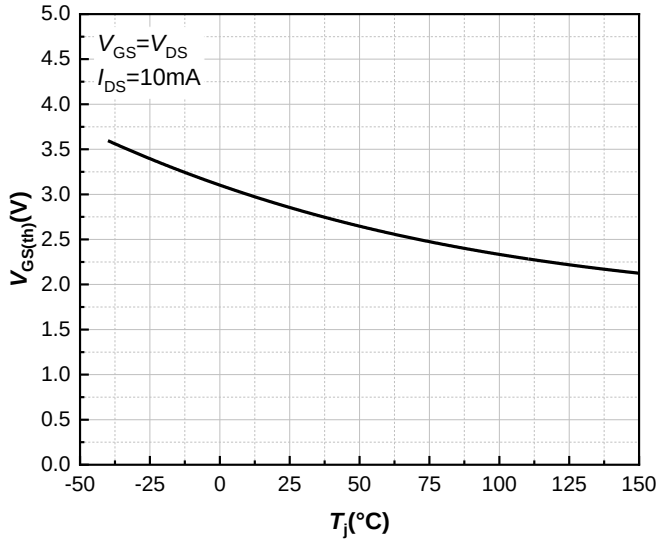


Figure 11. **Threshold Voltage vs. Temperature**

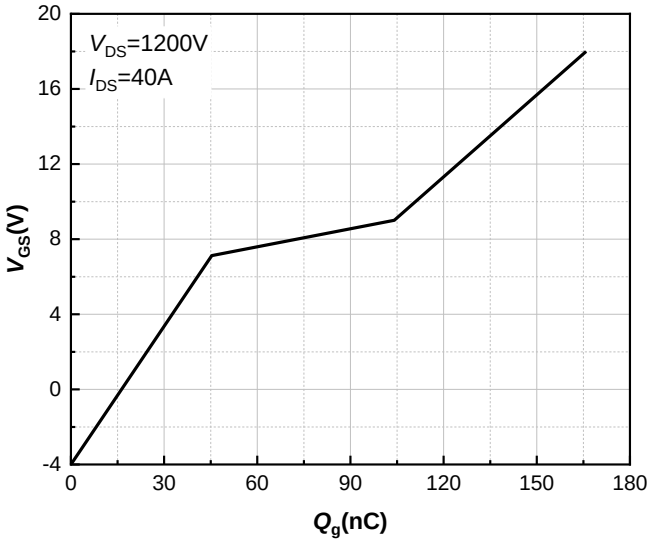


Figure 12. **Gate Charge Characteristics**

Typical Performance

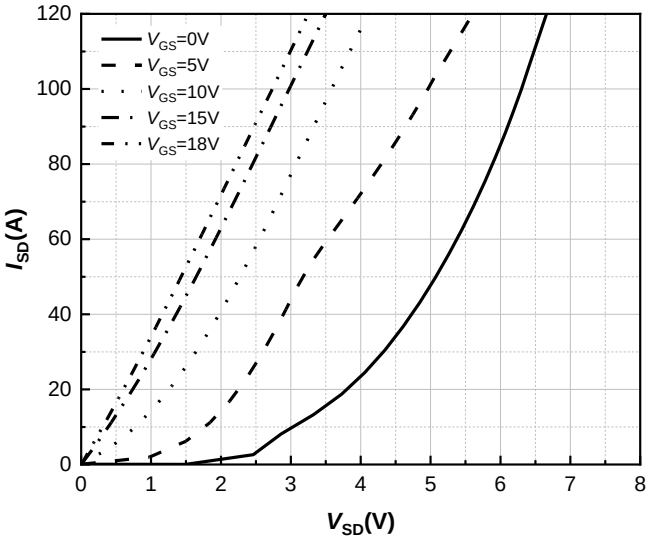


Figure 13. **3rd Quadrant Characteristic T_j=-40°C**

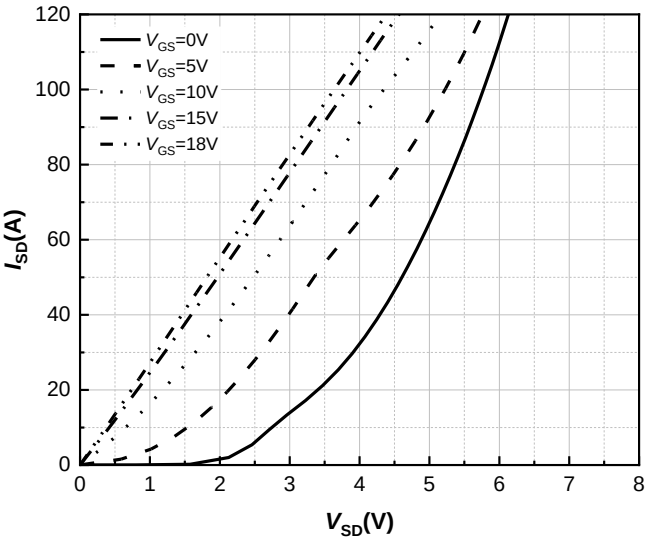


Figure 14. **3rd Quadrant Characteristic T_j=25°C**

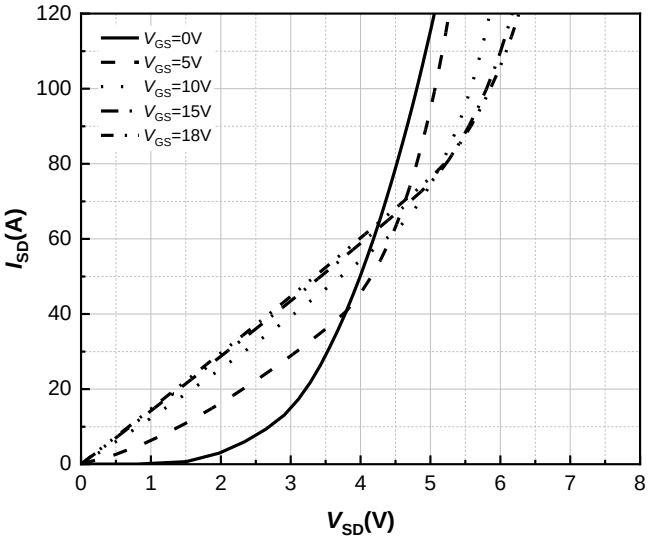


Figure 15. **3rd Quadrant Characteristic T_j=150°C**

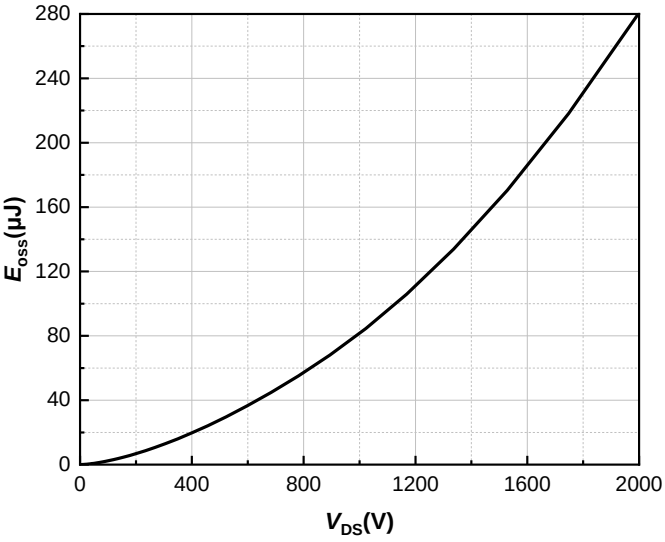


Figure 16. **Output Capacitor Stored Energy**

Typical Performance

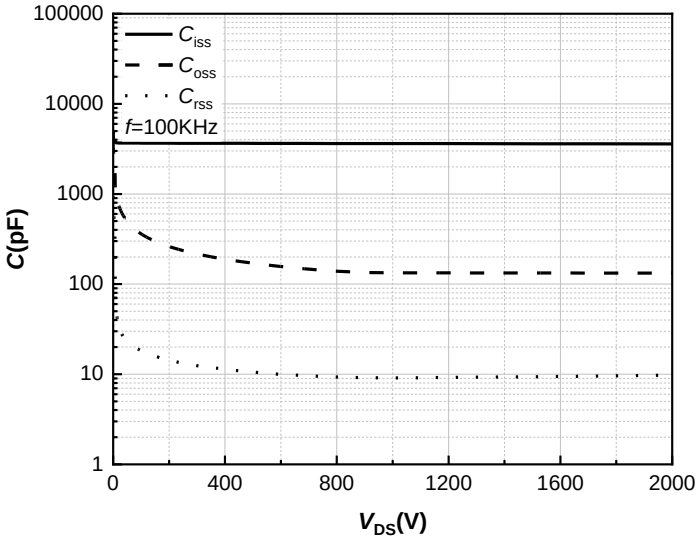
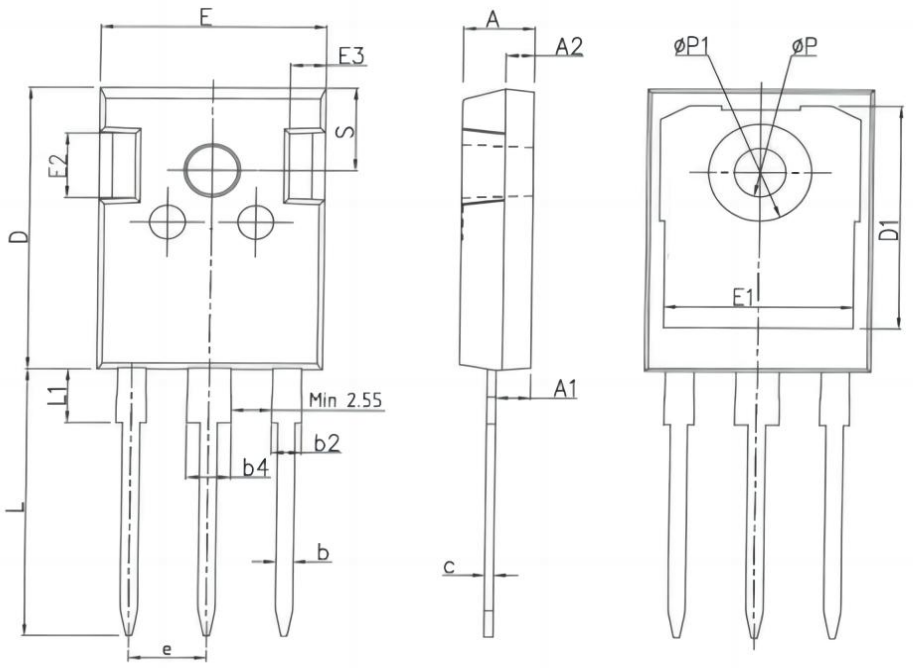


Figure 17. **Capacitances vs. Drain-Source**

Package Outlines



SYMBOL	Unit: mm		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44 BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S	6.15 BSC		