

SiC MOSFET
SiC N-Channel Planar Power MOSFET
General Features

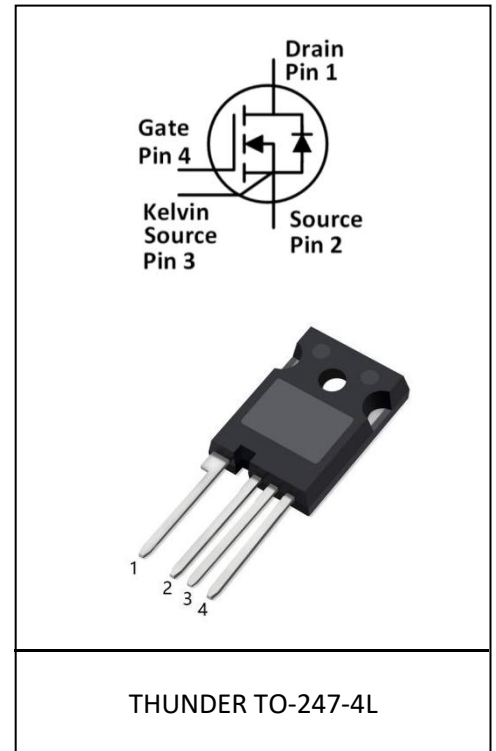
- $V_{DS}=1200V, I_D=42A$
- Low ON Resistance, $R_{DS(ON)}=80m\Omega @ V_{GS}=18V, I_D=20A$
- Low reverse transfer capacitance
- Low Qg for fast response
- Short fall & rise times for fast switching
- 100% single pulse avalanche energy Test

Benefits

- Reduce switching losses
- Increased system Switching Frequency
- Increased power density
- Reduction of heat sink requirements

Application

- Switch mode power supplies
- Renewable energy
- Motor drives
- High voltage DC/DC converters


Product Summary

V_{DS}	1200V
$R_{DS(on)}$	80m Ω
I_D	42A

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	1200	V
Continuous drain current	I_D^*	42	A
$T_C = 25^\circ C$		30	
$T_C = 100^\circ C$			
Pulsed drain current ($T_C = 25^\circ C$, t_p limited by T_{jmax})	I_{DM}^*	105	A
Gate-Source voltage	V_{GSmax}	-8/+22	V
Recommend Gate-Source Voltage	V_{GSop}	-4/+18	V
Operating junction and storage temperature	T_j, T_{stg}	-40...+175	$^\circ C$

* Verified by design

Electrical Characteristic (at $T_j = 25\text{ }^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

Static Characteristic

Drain-source breakdown voltage	BV_{DSS}	1200	-	-	V	$I_D = 100\text{ }\mu\text{A}, V_{GS} = 0\text{ V}$
Gate threshold voltage	$V_{GS(th)}$	2	2.7 2.2 2.0	4	V	$V_{DS} = V_{GS}, I_D = 5\text{ mA}$ $T_j = 25\text{ }^\circ\text{C}$ $T_j = 150\text{ }^\circ\text{C}$ $T_j = 175\text{ }^\circ\text{C}$
Zero gate voltage drain current	I_{DSS}	-	1	-	μA	$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}$
Gate-source leakage current	I_{GSS}	-	-	250	nA	$V_{DS} = 0\text{ V}, V_{GS} = 18\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	95 80 90	-	m Ω	$V_{GS} = 15\text{ V}, I_D = 20\text{ A}$ $T_j = 175\text{ }^\circ\text{C}$ $V_{GS} = 18\text{ V}, I_D = 20\text{ A}$ $T_j = 150\text{ }^\circ\text{C}$ $T_j = 175\text{ }^\circ\text{C}$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	2415	-	pF	$V_{DS} = 1000\text{ V},$ $f = 1\text{ MHz},$ $V_{GS} = 0\text{ V}$
Output Capacitance	C_{oss}	-	79	-		
Reverse Transfer Capacitance	C_{rss}	-	6	-		
Gate Total Charge	Q_g	-	103	-	nC	$V_{DS} = 800\text{ V},$ $I_D = 20\text{ A},$ $V_{GS} = -4/18\text{ V}$
Gate-Source charge	Q_{gs}	-	29	-		
Gate-Drain charge	Q_{gd}	-	36	-		

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	4.6 4.2	-	V	$V_{GS} = -4V, I_{SD} = 20A$ $T_j = 25^\circ C$ $T_j = 150^\circ C$
Body Diode Continuous Forward Current	I_S	-	43 23	-	A	$V_{GS} = -4V$ $T_C = 25^\circ C$ $T_C = 100^\circ C$
Body Diode Reverse Recovery Time	t_{rr}	-	56	-	ns	$V_{GS} = -4V, I_{SD} = 20A,$ $V_R = 800V,$ $di/dt = 3830A/us$
Body Diode Reverse Recovery Charge	Q_{rr}	-	76	-	μC	
Peak Reverse Recovery Current	I_{rm}		13		A	

Typical Performance

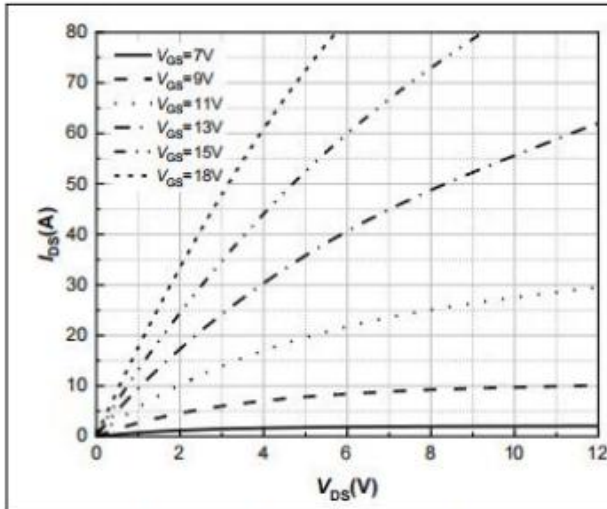


Figure 1. Output Characteristics
 $T_j = -40^\circ\text{C}$

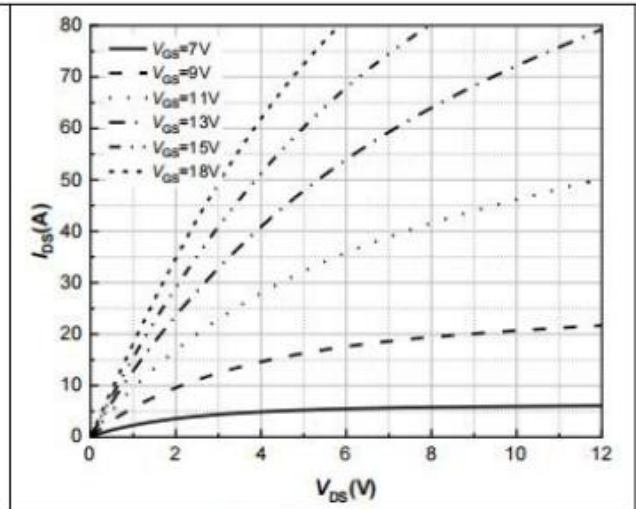


Figure 2. Output Characteristics
 $T_j = 25^\circ\text{C}$

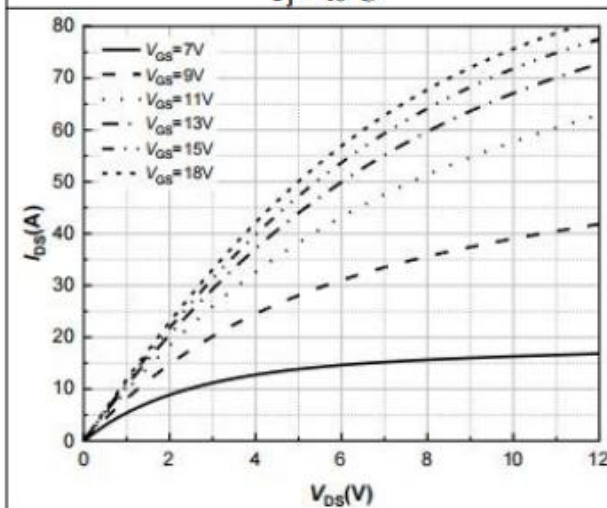


Figure 3. Output Characteristics
 $T_j = 175^\circ\text{C}$

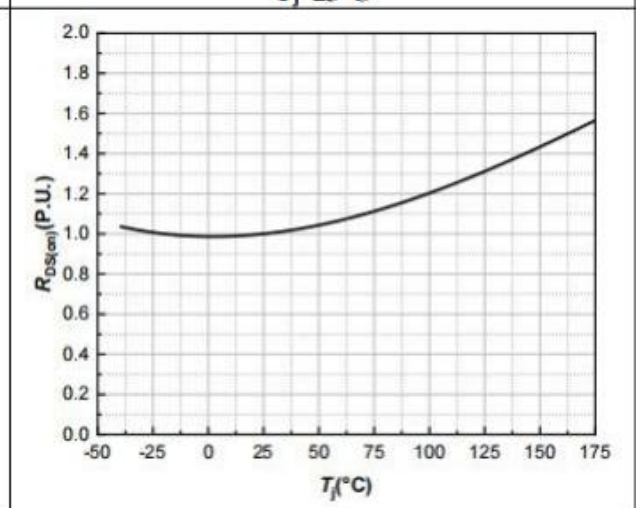


Figure 4. Normalized On-Resistance vs. Temperature

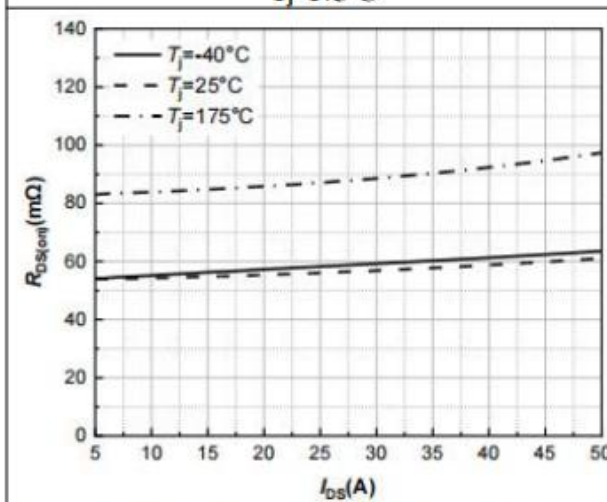


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

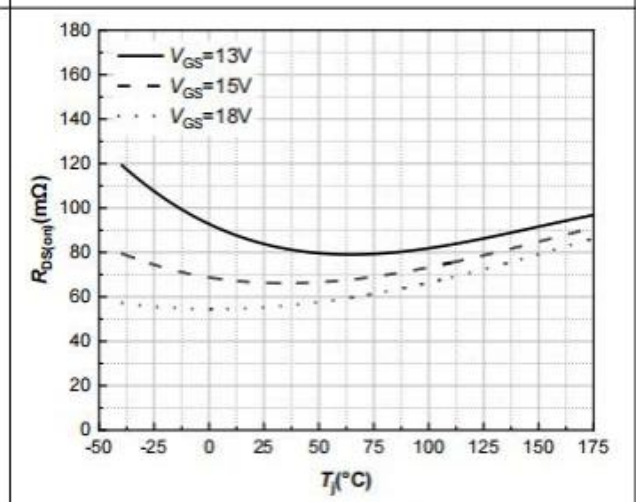


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

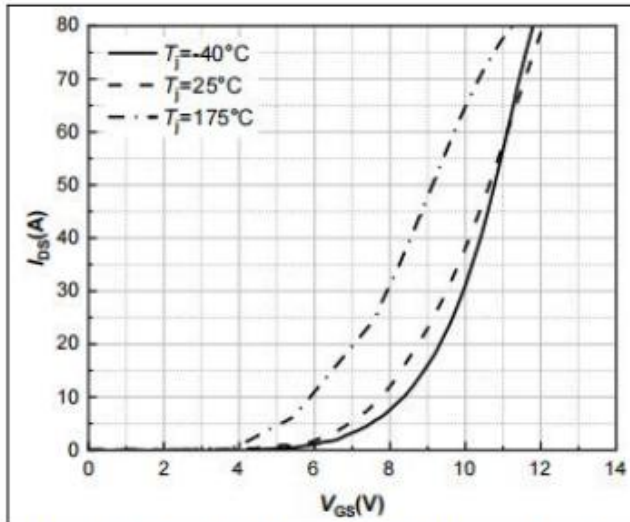


Figure 7. Transfer Characteristic for Various Junction Temperatures $V_{DS}=20V$

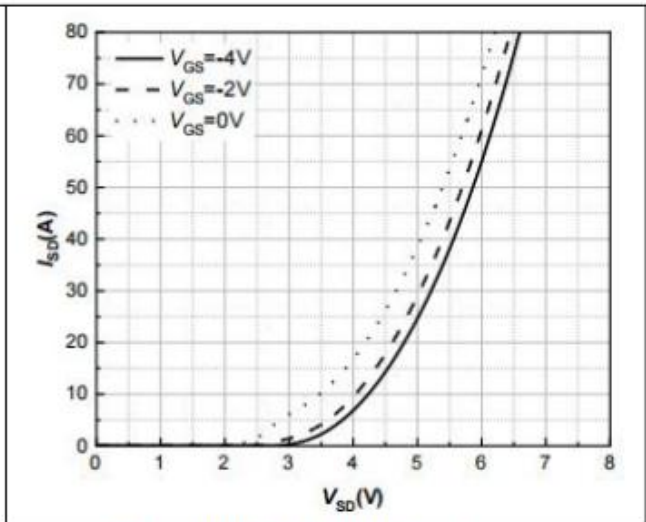


Figure 8. Body Diode Characteristic $T_J=-40^{\circ}C$

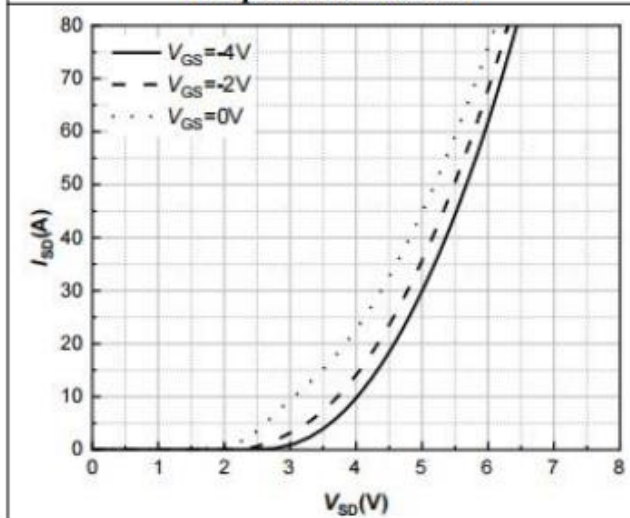


Figure 9. Body Diode Characteristic $T_J=25^{\circ}C$

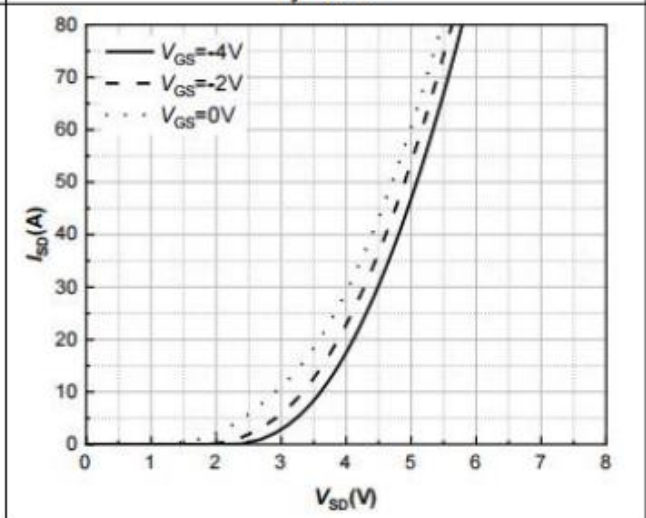


Figure 10. Body Diode Characteristic $T_J=175^{\circ}C$

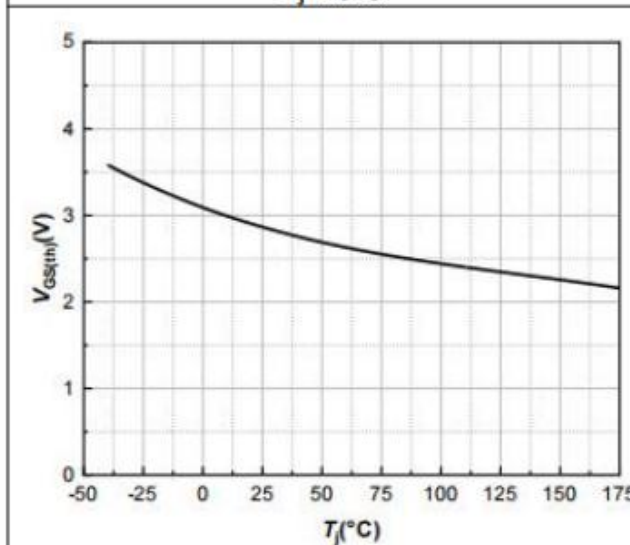


Figure 11. Threshold Voltage vs. Temperature

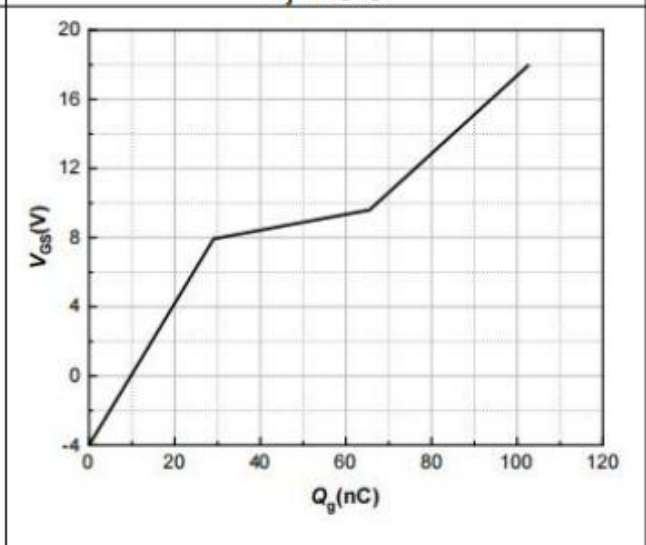


Figure 12. Gate Charge Characteristics

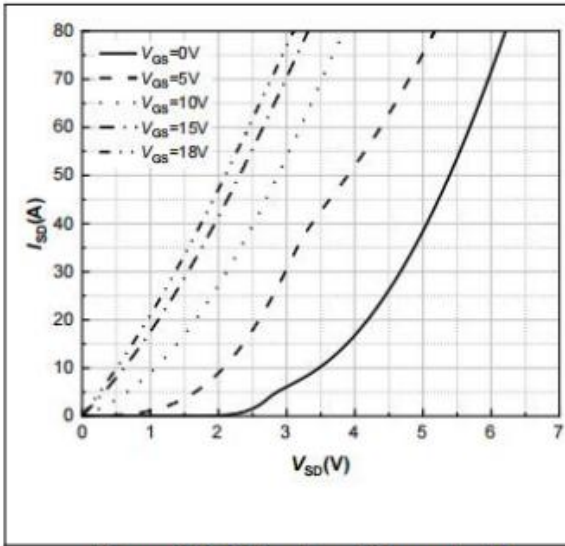


Figure 13. 3rd Quadrant Characteristic
 $T_j = -40^\circ\text{C}$

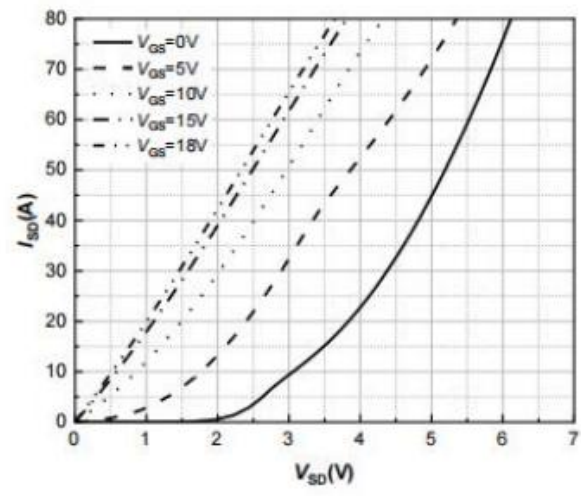


Figure 14. 3rd Quadrant Characteristic
 $T_j = 25^\circ\text{C}$

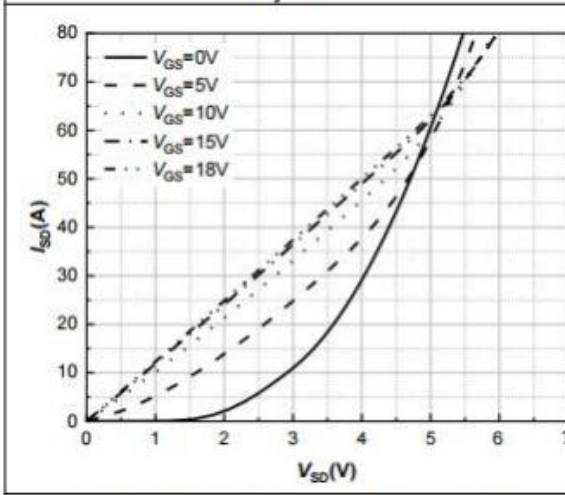


Figure 15. 3rd Quadrant Characteristic
 $T_j = 175^\circ\text{C}$

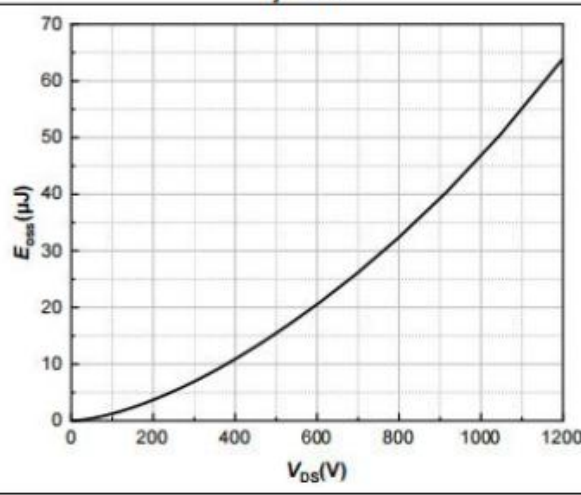


Figure 16. Output Capacitor Stored Energy

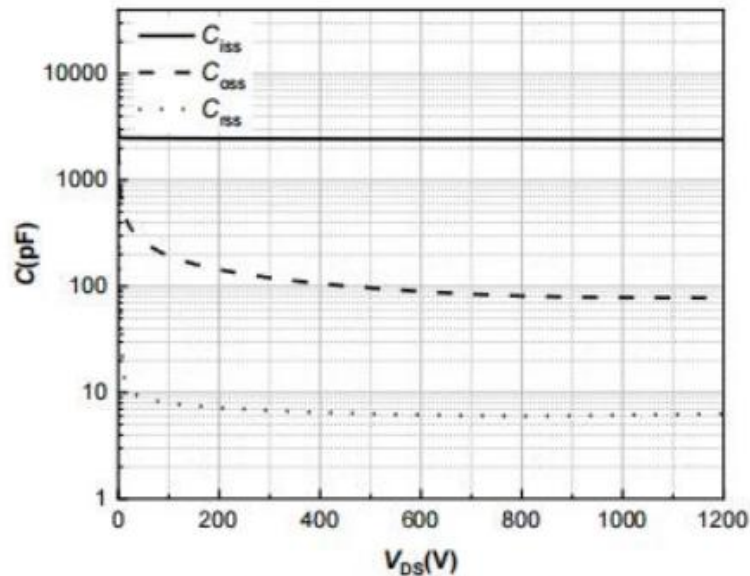
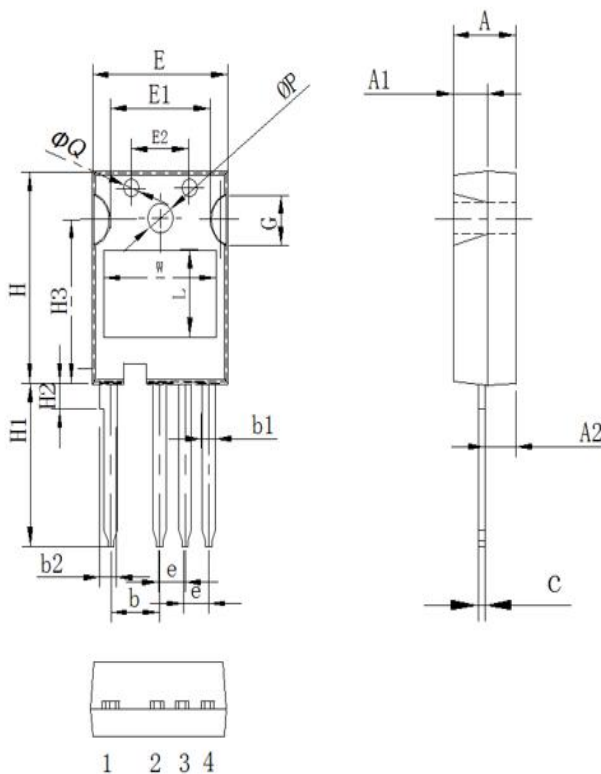


Figure 17. Capacitances vs. Drain-Source

Package Information

TO-247-4L PACKAGE

基本尺寸



Symbol	单位 mm		
	Min	Nom	Max
A	4.8	5.00	5.20
A1	2.8	3.0	3.2
A2	2.20	2.40	2.60
b	4.85	5.05	5.25
b1	1.15	1.25	1.35
b2	2.30	2.50	2.70
c	0.50	0.60	0.70
e	2.35	2.55	2.75
E	15.5	15.7	15.9
E1	10.5	10.7	10.9
E2	7.4	7.6	7.8
G	4.8	5.0	5.2
H	22.4	22.6	22.8
H1	17.5	18.0	18.5
H2	2.42	2.62	2.82
H3	16.17	16.37	16.57
ΦP	3.40	3.60	3.8
ΦQ	2.3	2.5	2.7
W	11.8	12	12.2
L	8.3	8.5	8.7

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