

## Normally-On Trench Silicon Carbide Power JFET

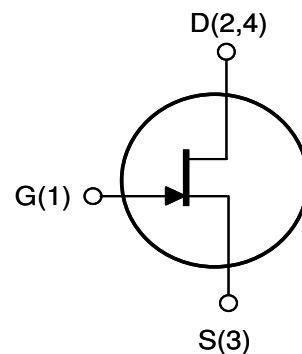
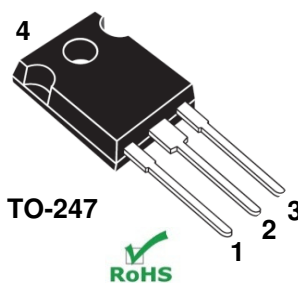
Product Summary		
$BV_{DS}$	1700	V
$R_{DS(on)max}$	1.400	$\Omega$

### Features:

- Positive Temperature Coefficient for Ease of Paralleling
- Extremely Fast Switching with No "Tail" Current at 150 °C
- $R_{DS(on)max}$  of 1.40  $\Omega$
- Voltage Controlled
- Low Gate Charge
- Low Intrinsic Capacitance

### Applications:

- Auxiliary Power Supplies
- SMPS



Internal Schematic

## MAXIMUM RATINGS

Parameter	Symbol	Conditions	Value	Unit
Continuous Drain Current	$I_{D,TC=25}$	$T_C = 25\text{ }^\circ\text{C}$	3	A
	$I_{D,TC=100}$	$T_C = 100\text{ }^\circ\text{C}$	2	
Pulsed Drain Current <sup>(1)</sup>	$I_{DM}$	$T_j = 25\text{ }^\circ\text{C}$	6	A
Short Circuit Withstand Time	$t_{SC}$	$V_{DD} < 800\text{ V}, T_C < 125\text{ }^\circ\text{C}$	50	$\mu\text{s}$
Power Dissipation	$P_D$	$T_C = 25\text{ }^\circ\text{C}$	35	W
Gate-Source Voltage	$V_{GS}$	AC <sup>(2)</sup>	-18 to +15	V
Operating and Storage Temperature	$T_j, T_{stg}$		-55 to +150	$^\circ\text{C}$
Lead Temperature for Soldering	$T_{sold}$	1/8" from case < 10 s	260	$^\circ\text{C}$

<sup>(1)</sup> Pulse width limited by maximum junction temperature

<sup>(2)</sup>  $R_{g(EXT)} = 1\text{ }\Omega, t_p \leq 200\text{ ns}$ , see Figure 6 for static conditions

## THERMAL CHARACTERISTICS

Parameter	Symbol	Value		Unit
		Typ	Max	
Thermal Resistance, junction-to-case	$R_{th,JC}$	-	3.6	$^\circ\text{C} / \text{W}$
Thermal Resistance, junction-to-ambient	$R_{th,JA}$	-	50	

### ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Conditions	Value			Unit
			Min	Typ	Max	

#### Off Characteristics

Drain-Source Blocking Voltage	$BV_{DS}$	$V_{GS} = -15\text{ V}, I_D = 60\ \mu\text{A}$	1700	-	-	V
Total Drain Leakage Current	$I_{DSS}$	$V_{DS} = 1700\text{ V}, V_{GS} = -15\text{ V}, T_j = 25^\circ\text{C}$	-	10	-	$\mu\text{A}$
		$V_{DS} = 1700\text{ V}, V_{GS} = -15\text{ V}, T_j = 150^\circ\text{C}$	-	100	-	
Total Gate Reverse Leakage	$I_{GSS}$	$V_{GS} = -15\text{ V}, V_{DS} = 0\text{ V}$	-	-0.01	-0.01	$\mu\text{A}$
		$V_{GS} = -15\text{ V}, V_{DS} = 1700\text{ V}$	-	-0.01	-	

#### On Characteristics

Drain-Source On-resistance	$R_{DS(on)}$	$I_D = 2\text{ A}, V_{GS} = 2\text{ V}, T_j = 25^\circ\text{C}$	-	0.870	1.4	$\Omega$
		$I_D = 2\text{ A}, V_{GS} = 2\text{ V}, T_j = 100^\circ\text{C}$	-	1.66	-	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = 1\text{ V}, I_D = 3\text{ mA}$	-	-5	-	V
Gate Forward Current	$I_{GFWD}$	$V_{GS} = 2\text{ V}$	-	1	-	$\mu\text{A}$
Gate Resistance	$R_G$	$f = 1\text{ MHz}, \text{ drain-source shorted}$	-	TBD	-	$\Omega$

#### Dynamic Characteristics

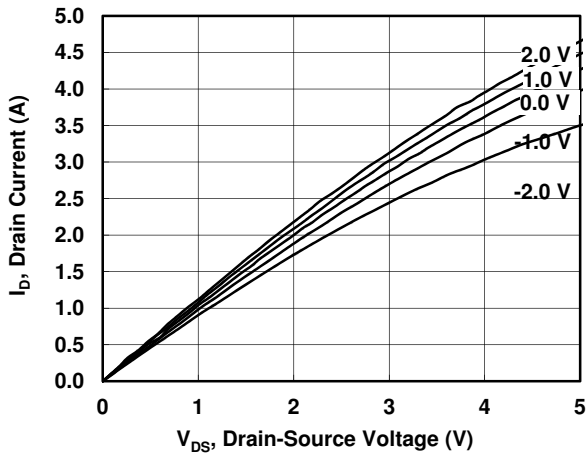
Input Capacitance	$C_{iss}$	$V_{DD} = 100\text{ V}, V_{GS} = -15\text{ V}, f = 100\text{ kHz}$	-	32	-	$\text{pF}$
Output Capacitance	$C_{oss}$		-	16	-	
Reverse Transfer Capacitance	$C_{rss}$		-	15	-	
Effective Output Capacitance, energy related	$C_{o(er)}$	$V_{DS} = 0\text{ V to } 600\text{ V}, V_{GS} = -15\text{ V}$	-	10	-	

#### Switching Characteristics

Turn-on Delay	$t_{on}$	$V_{DS} = 850\text{ V}, I_D = 2\text{ A}, \text{ Inductive Load}, T_j = 25^\circ\text{C}$ Gate Driver = +15 V, -15 V, $R_{g(EXT)} = 20\ \Omega$	-	TBD	-	ns
Rise Time	$t_r$		-	10	-	
Turn-off Delay	$t_{off}$		-	TBD	-	
Fall Time	$t_f$		-	20	-	$\mu\text{J}$
Turn-on Energy	$E_{on}$		-	37	-	
Turn-off Energy	$E_{off}$		-	8	-	
Total Switching Energy	$E_{ts}$	-	45	-		
Turn-on Delay	$t_{on}$	$V_{DS} = 850\text{ V}, I_D = 2\text{ A}, \text{ Inductive Load}, T_j = 150^\circ\text{C}$ Gate Driver = +15 V, -15 V, $R_{g(EXT)} = 20\ \Omega$	-	TBD	-	ns
Rise Time	$t_r$		-	TBD	-	
Turn-off Delay	$t_{off}$		-	TBD	-	
Fall Time	$t_f$		-	TBD	-	$\mu\text{J}$
Turn-on Energy	$E_{on}$		-	TBD	-	
Turn-off Energy	$E_{off}$		-	TBD	-	
Total Switching Energy	$E_{ts}$	-	TBD	-		
Total Gate Charge	$Q_g$	$V_{DS} = 1200\text{ V}, I_D = 2\text{ A}, V_{GS} = -15\text{ V to } +2\text{ V}$	-	16	-	nC
Gate-Source Charge	$Q_{gs}$		-	1	-	
Gate-Drain Charge	$Q_{gd}$		-	13	-	

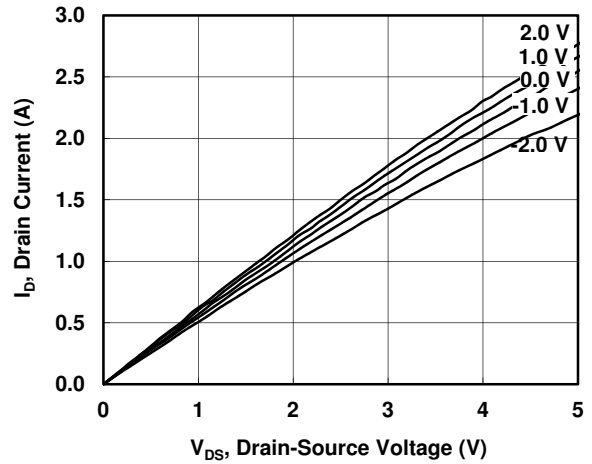
**Figure 1. Typical Output Characteristics**

$I_D = f(V_{DS}); T_j = 25\text{ }^\circ\text{C}; \text{parameter: } V_{GS}$



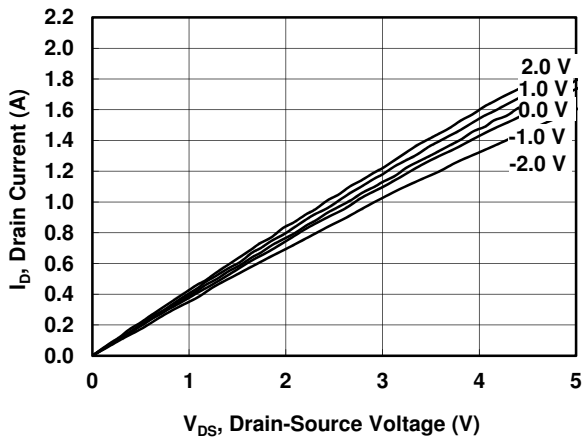
**Figure 2. Typical Output Characteristics**

$I_D = f(V_{DS}); T_j = 100\text{ }^\circ\text{C}; \text{parameter: } V_{GS}$



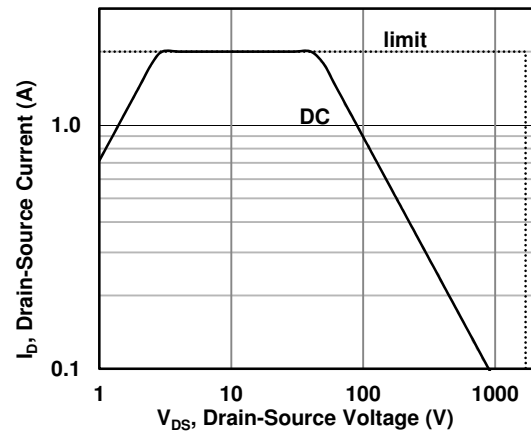
**Figure 3. Typical Output Characteristics**

$I_D = f(V_{DS}); T_j = 150\text{ }^\circ\text{C}; \text{parameter: } V_{GS}$



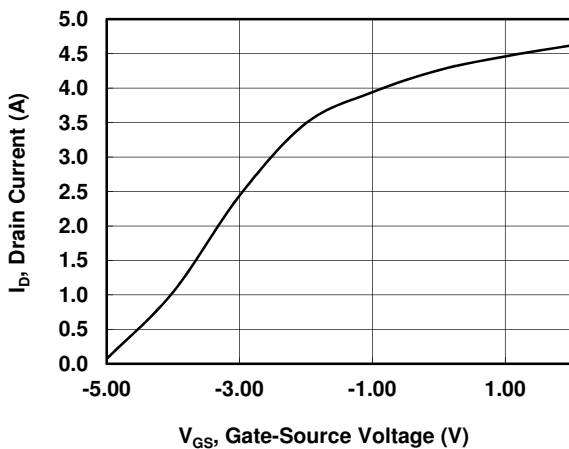
**Figure 4. Safe Operating Area**

$I_D = f(V_{DS}); T_C = 25\text{ }^\circ\text{C}$



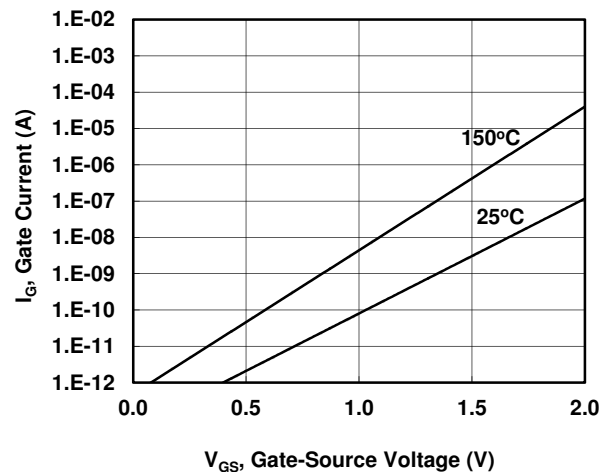
**Figure 5. Typical Transfer Characteristics**

$I_D = f(V_{GS}); V_{DS} = 5\text{ V}; T_j = 25\text{ }^\circ\text{C}$



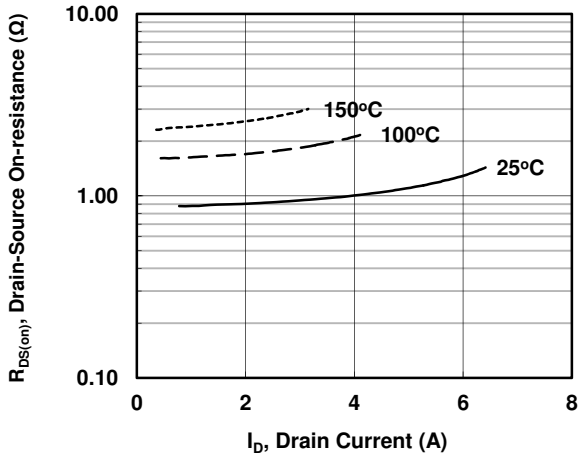
**Figure 6. Gate Current**

$I_G = f(V_{GS}); \text{parameter: } T_j$



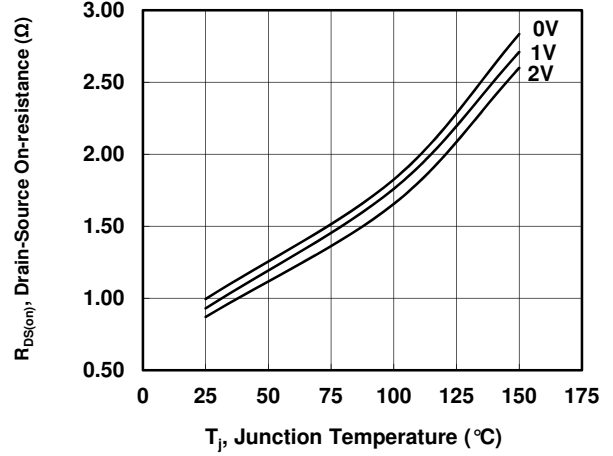
**Figure 7. Drain-Source On-resistance**

$R_{DS(on)} = f(I_D); V_{GS} = 2.0 \text{ V}; \text{parameter: } T_j$



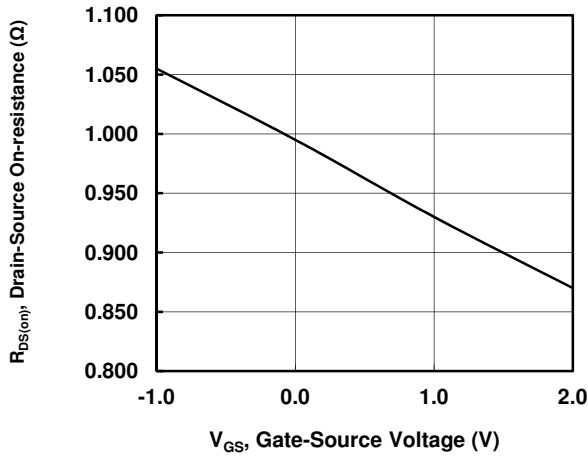
**Figure 8. Drain-Source On-resistance**

$R_{DS(on)} = f(T_j); I_D = 2 \text{ A}; \text{parameter: } V_{GS}$



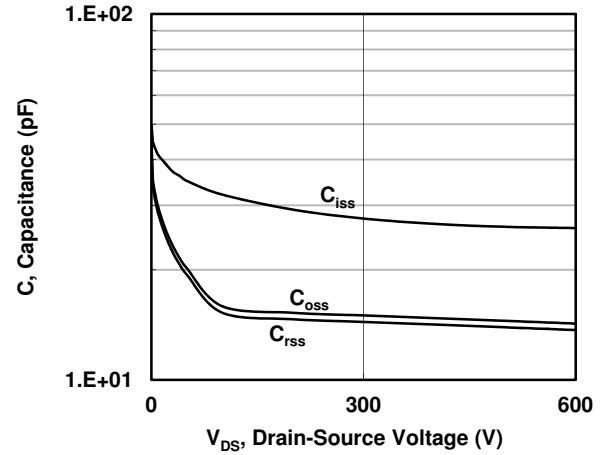
**Figure 9. Drain-Source On-resistance**

$R_{DS(on)} = f(V_{GS}); I_D = 2 \text{ A}; T_j = 25^\circ\text{C}$



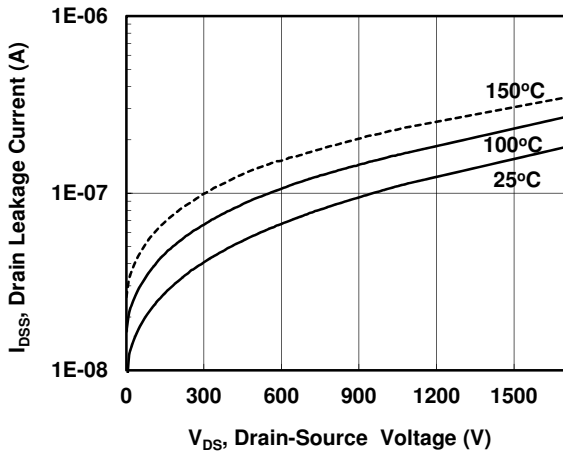
**Figure 10. Typical Capacitance**

$C = f(V_{DS}); V_{GS} = -15 \text{ V}; f = 100 \text{ kHz}$

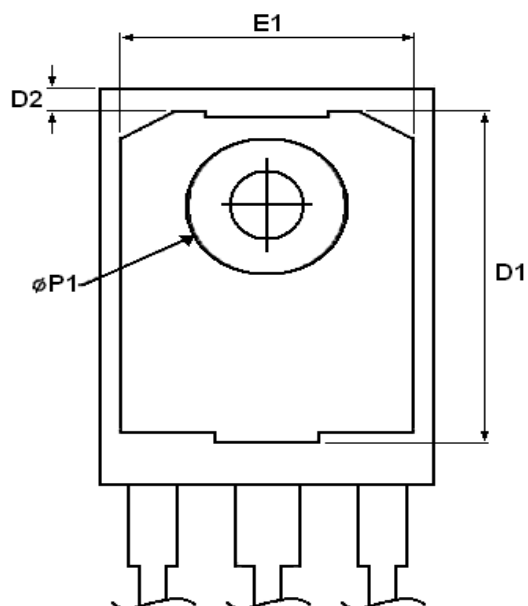
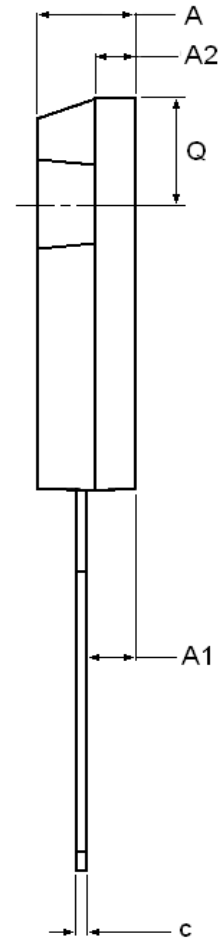
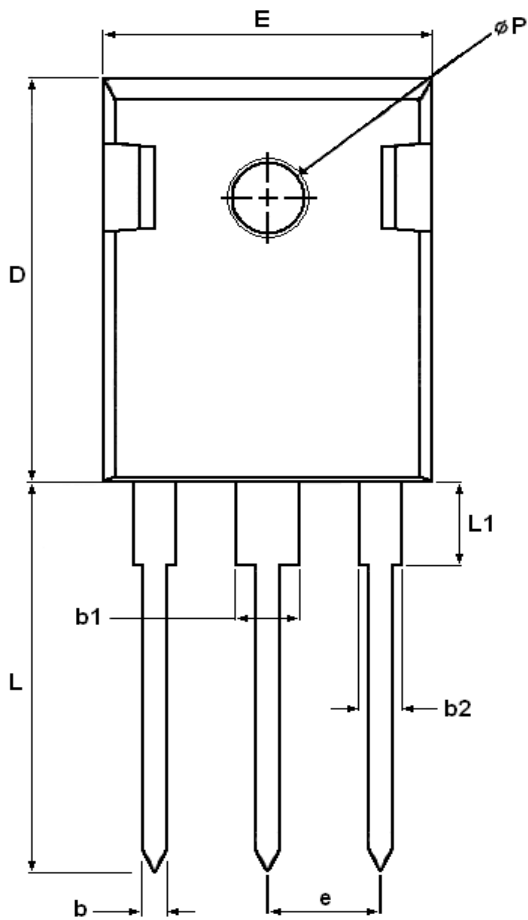


**Figure 11. Drain-Source Leakage**

$I_{DSS} = f(V_{DS}); V_{GS} = -15 \text{ V}; \text{parameter: } T_j$



**Package Dimensions: 3 Lead TO-247**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.903	5.157	0.193	0.203
A1	2.273	2.527	0.090	0.100
A2	1.853	2.108	0.073	0.083
b	1.073	1.327	0.042	0.052
b1	2.873	3.381	0.113	0.133
b2	1.903	2.386	0.075	0.094
c	0.600	0.752	0.024	0.030
D	20.823	21.077	0.820	0.830
D1	17.393	17.647	0.685	0.695
D2	1.063	1.317	0.042	0.052
e	5.450		0.215	
E	15.773	16.027	0.621	0.631
E1	13.893	14.147	0.547	0.557
L	20.053	20.307	0.789	0.799
L1	4.168	4.472	0.165	0.175
Q	6.043	6.297	0.238	0.248
ØP	3.560	3.660	0.140	0.144
ØP1	7.063	7.317	0.278	0.288

Published by  
SemiSouth Laboratories, Inc.  
201 Research Boulevard  
Starkville, MS 39759 USA  
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