

Normally-On Trench Silicon Carbide Power JFET

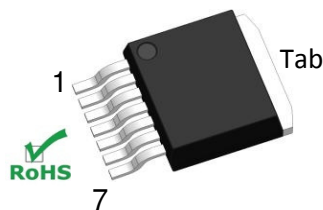
Product Summary		
BV_{DS}	1700	V
$R_{DS(on)max}$	1.400	Ω

Features:

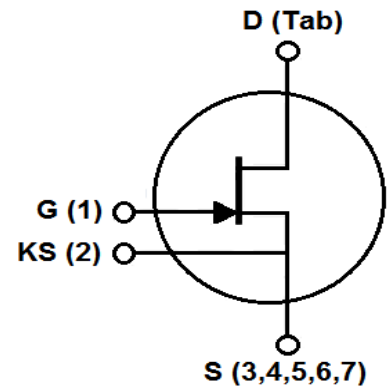
- Positive Temperature Coefficient for Ease of Paralleling
- Extremely Fast Switching with No "Tail" Current at 150 °C
- $R_{DS(on)max}$ of 1.40 Ω
- Voltage Controlled
- Low Gate Charge
- Low Intrinsic Capacitance

Applications:

- Auxiliary Power Supplies
- SMPS



High-Creepage, 7 Lead D2pak
(TO-263)



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 ⁽¹⁾	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	μs
Power Dissipation	P_D	$T_C = 25\text{ }^\circ\text{C}$	35	W
Gate-Source Voltage	V_{GS}	AC ⁽²⁾	-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	$^\circ\text{C}$

⁽¹⁾ Pulse width limited by maximum junction temperature

⁽²⁾ $R_{g(EXT)} = 1\text{ }\Omega, t_p \leq 200\text{ ns}$, 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	-	μA
		$V_{DS} = 1700\text{ V}, V_{GS} = -15\text{ V}, T_j = 150^\circ\text{C}$	-	100	-	
Total Gate Reverse Leakage	I_{GSS}	$V_{GS} = -15\text{ V}, V_{DS} = 0\text{ V}$	-	-0.01	-0.01	μA
		$V_{GS} = -15\text{ V}, V_{DS} = 1700\text{ V}$	-	-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	Ω
		$I_D = 2\text{ A}, V_{GS} = 2\text{ V}, T_j = 100^\circ\text{C}$	-	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	-	μA
Gate Resistance	R_G	$f = 1\text{ MHz}, \text{ drain-source shorted}$	-	TBD	-	Ω

Dynamic Characteristics

Input Capacitance	C_{iss}	$V_{DD} = 100\text{ V}, V_{GS} = -15\text{ V}, f = 100\text{ kHz}$	-	32	-	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	-	μJ
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	-	μJ
Turn-on Energy	E_{on}		-	TBD	-	
Turn-off Energy	E_{off}		-	TBD	-	
Total Switching Energy	E_{ts}	-	TBD	-		
Total Gate Charge	Q_g	$V_{DS} = 1200\text{ V}, I_D = 2\text{ A}, V_{GS} = -15\text{ V to } +2\text{ V}$	-	0.5	-	nC
Gate-Source Charge	Q_{gs}		-	13	-	
Gate-Drain Charge	Q_{gd}		-	16	-	

Figure 1. Typical Output Characteristics

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

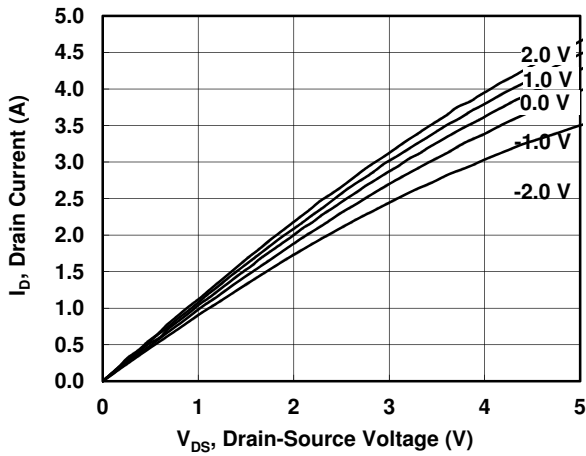


Figure 2. Typical Output Characteristics

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

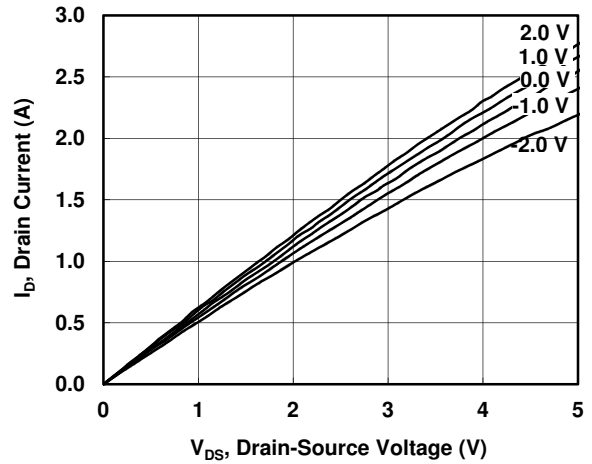


Figure 3. Typical Output Characteristics

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

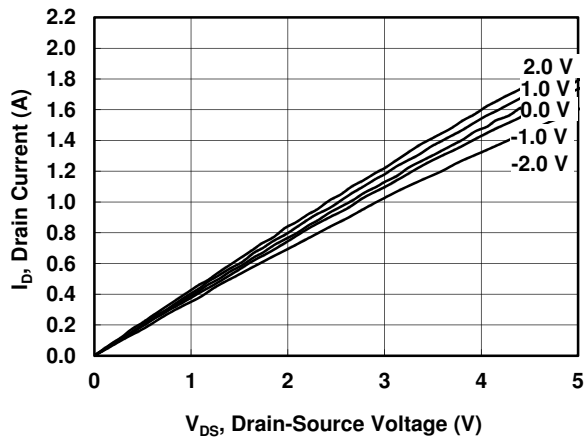


Figure 4. Safe Operating Area

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

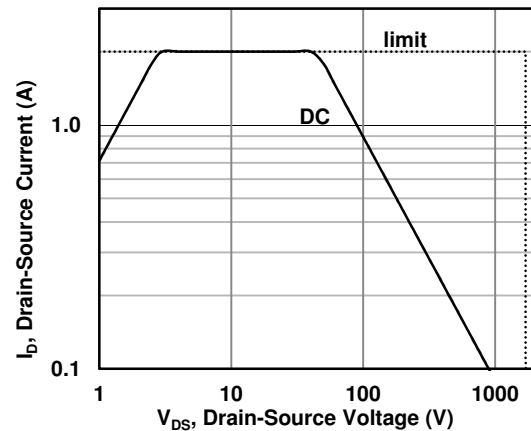


Figure 5. Typical Transfer Characteristics

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

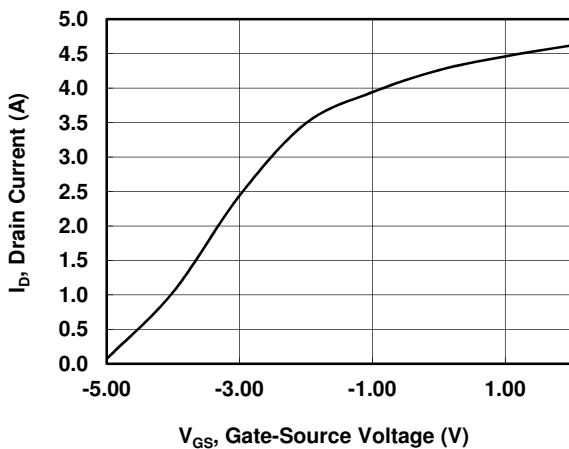


Figure 6. Gate Current

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

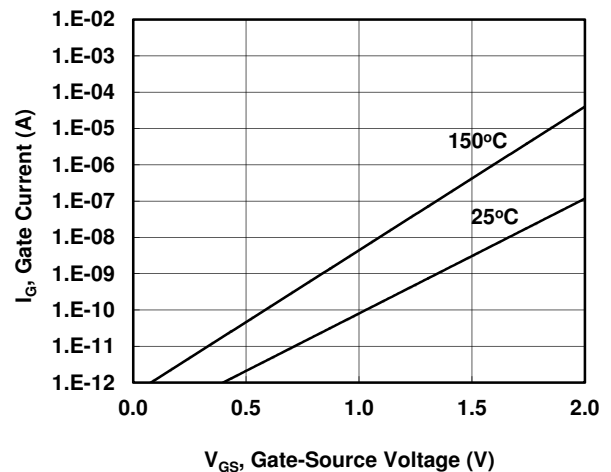


Figure 7. Drain-Source On-resistance

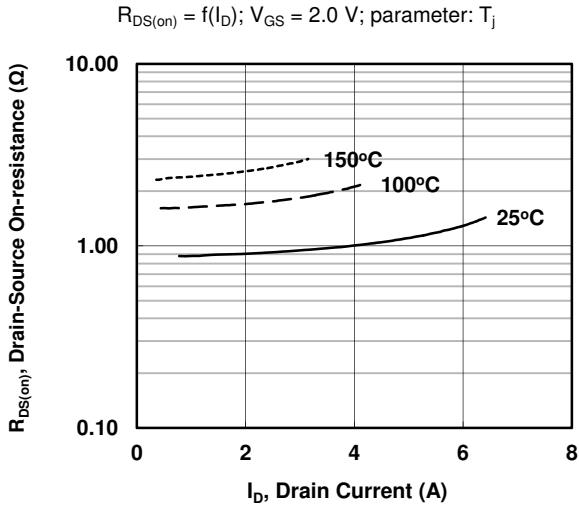


Figure 8. Drain-Source On-resistance

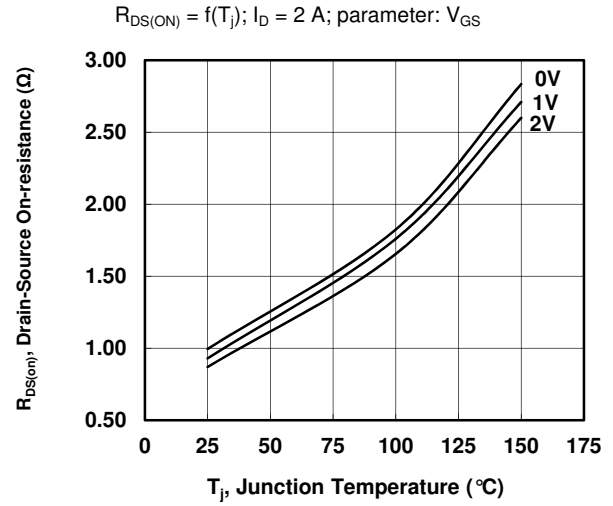


Figure 9. Drain-Source On-resistance

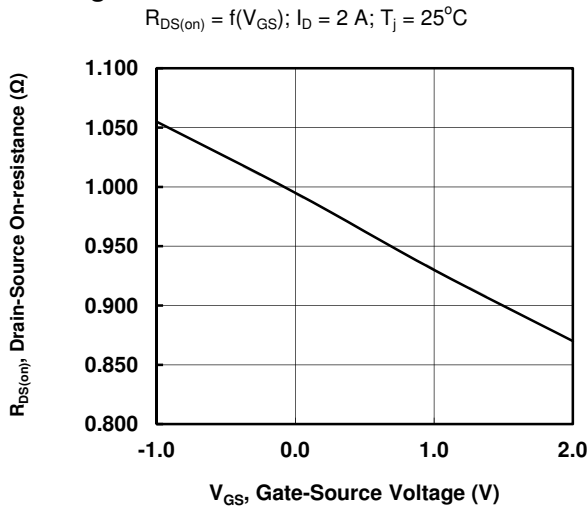


Figure 10. Typical Capacitance

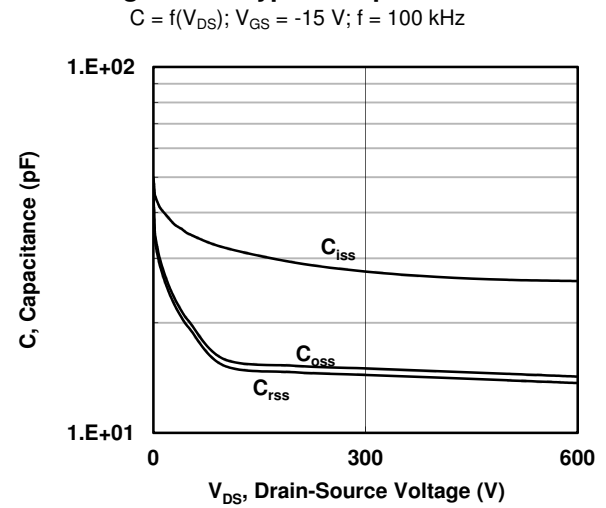
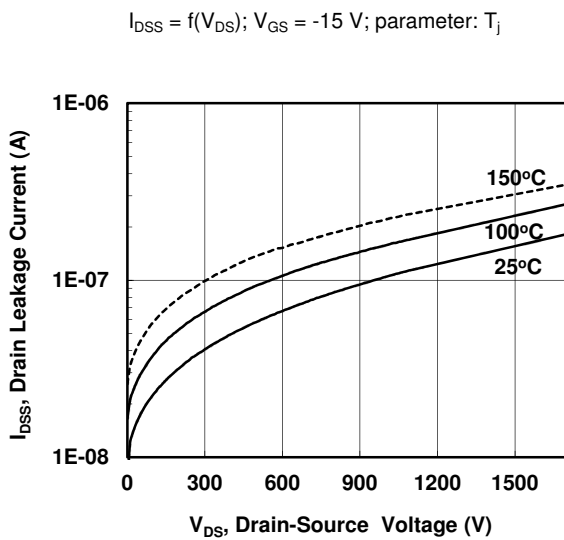
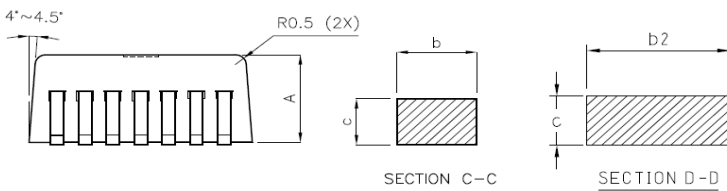
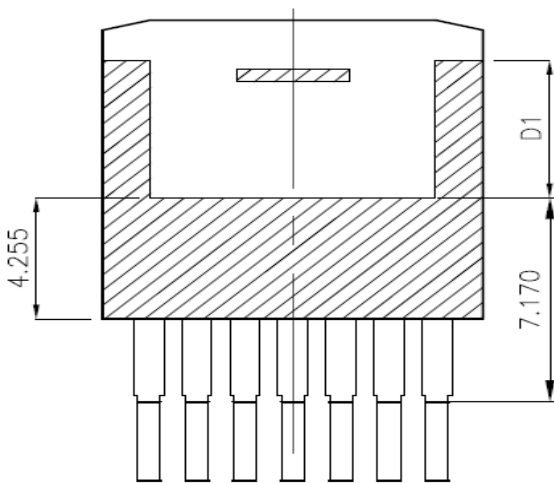
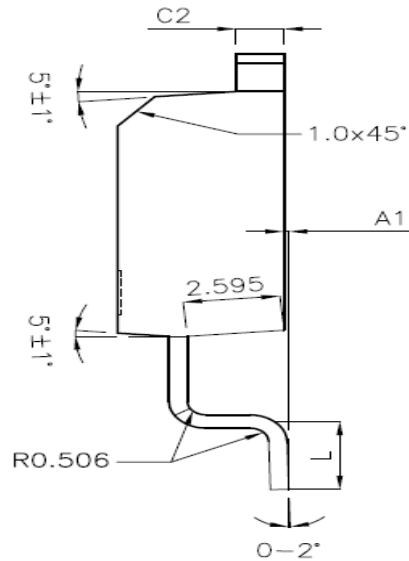
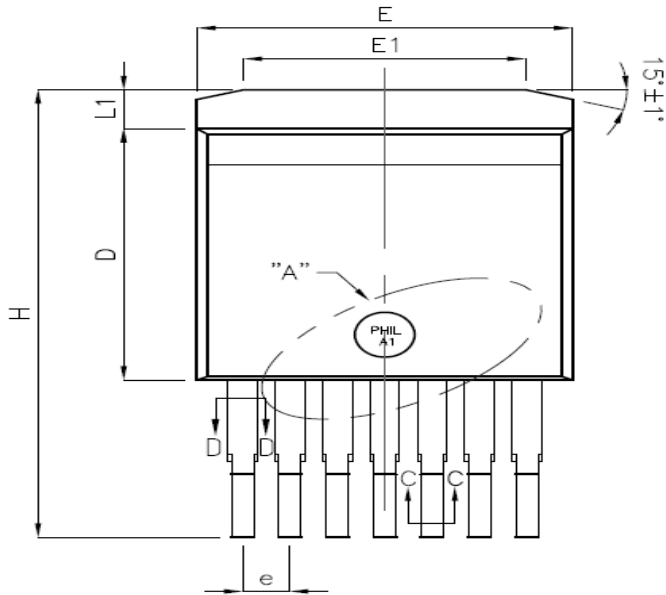


Figure 11. Drain-Source Leakage



Package Dimensions: 7 Lead TO-263



DIM	Millimeter	
	Min	Max
A	4.300	4.570
A1	0.000	0.250
b	0.500	0.700
b2	0.600	1.000
c	0.330	0.650
C2	1.170	1.400
D	9.025	9.125
D1	4.770	4.870
E	10.130	10.230
E1	6.500	8.600
e	1.270	
H	15.043	17.313
L	2.324	2.700
L1	0.968	1.868

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