SD11721

1200V SiC N-Channel Power MOSFET - 1

KEY FEATURES

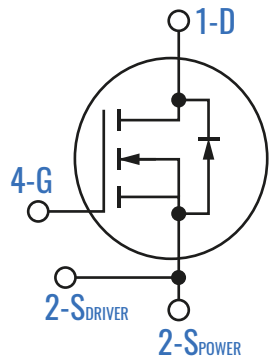
- I_D = 58A
- $R_{DS(ON)}$ = 50mΩ
- TO-247-4 PLASTIC PACKAGE
- OPTIMIZED PACKAGE WITH SEPARATE DRIVER SOURCE PIN
- 8MM CREEPAGE DISTANCE BETWEEN DRAIN AND SOURCE

BENEFITS

- HIGH BLOCKING VOLTAGE WITH LOW ON-RESISTANCE
- HIGH SPEED SWITCHING WITH LOW CAPACITANCE
- HIGH OPERATING JUNCTION TEMPERATURE CAPABILITY
- VERY FAST AND ROBUST INTRINSIC BODY DIODE

APPLICATIONS

- SOLAR INVERTERS
- UPS
- MOTOR DRIVERS
- HIGH VOLTAGE DC/DC CONVERTERS
- SWITCH MODE POWER SUPPLIES



V_{DS} = 1200V
I_D @ 25°C = 58A
$R_{DS(on)}$ = 50mΩ

ORDERING GUIDE

Part Number	SD11721
Description	1200V SiC N-Channel Power MOSFET

ABSOLUTE MAXIMIMUM RATINGS (T_C = 25°C)

SYMBOL	CHARACTERISTIC	TEST CONDITIONS	VALUE	UNIT
$V_{DS, max}$	Drain-Source Voltage	V_{GS} = 0V, I_D = 100μA	1200	V
$V_{GS, max}$	Gate-Source Voltage	Absolute maximum values	-5/+20	V
I_D	Continuous Drain Current (see fig. 21)	V_{GS} = 20V, T_C = 25°C V_{GS} = 20V, T_C = 100°C	58 43	A A
$I_{D, pulse}$	Pulsed Drain Current (see fig. 24)	Pulse Width Limited by SOA	15	A
P_D	Maximum Power Dissipation (see fig. 22)	T_C = 25°C	327	W
T_J, T_{STG}	Junction Temperature, Operating and Storage		-55 to +175	°C
T_L	Solder Temperature	Wave soldering only allowed at leads, 1.6mm from case for 10s	260	°C

THERMAL DATA

SYMBOL	CHARACTERISTIC	TEST CONDITIONS	VALUE	UNIT
$R_{\theta(J-C)}$	Thermal Resistance from Junction to Case	see fig. 23	0.459	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C)

SYMBOL	CHARACTERISTIC		TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_{DSS}	Zero Gate Voltage Drain Current		V_{DS} = 1200V, V_{GS} = 0V		5	100	µA
$I_{G\,SS}$	Gate Leakage Current		V_{DS} = 0V, V_{GS} = -5 to 20V		1	±100	nA
V_{TH}	Gate Threshold Voltage	(see figs. 8 & 9)	V_{GS} = V_{DS}, I_D = 6mA, T_C = 25°C		3.2		V
			V_{GS} = V_{DS}, I_D = 6mA, T_C = 175°C		2.2		
R_{ON}	Static Drain-Source ON Resistance	(see figs. 4, 5, 6 & 7)	V_{GS} = 20V, I_D = 20A, T_C = 25°C		50	65	mΩ
			V_{GS} = 20V, I_D = 20A, T_C = 175°C		80		
C_{iss}	Input Capacitance	(see fig. 16)	V_{DS} = 800V, V_{GS} = 0V, f = 1MHz, V_{AC} = 25mV		2700		pF
C_{oss}	Output Capacitance	(see fig. 16)			110		
C_{rss}	Reverse Transfer Capacitance	(see fig. 16)			10		
E_{oss}	C_{oss} Stored Energy	(see fig. 17)			45		µJ
Q_g	Total Gate Charge	(see fig. 18)	V_{DS} = 800V, I_D = 20A, V_{GS} = 5 to 20V		120		nC
Q_{gs}	Gate-Source Charge	(see fig. 18)			25		
Q_{gd}	Gatre-Drain Charge	(see fig. 18)			48		
R_g	Gate Input Resistance		f = 1MHz		2.8		Ω
E_{ON}	Turn-On Switching Energy	(see figs. 19 & 20)	V_{DS} = 800V, I_D = 30A, V_{GS} = 2 to 20V, $R_{G(ext)}$ = 3.3Ω, L= 450µH		877		µJ
E_{OFF}	Turn-Off Switching Energy	(see figs. 19 & 20)			211		
$t_{d(on)}$	Turn-On Delay Time	(see figs. 19 & 20)			31		ns
t_r	Rise Time	(see figs. 19 & 20)			22		
$t_{d(off)}$	Turn-Off Delay Time	(see figs. 19 & 20)			22		
t_f	Fall Time	(see figs. 19 & 20)			19		

REVERSE DIODE CHARACTERISTICS (T_c = 25°C)

SYMBOL	CHARACTERISTIC		TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{SD}	Diode Forward Voltage	(see figs. 10, 11 & 12)	V_{GS} = 0V, I_{SD} = 20A, T_j = +25°C		4.9		V
			V_{GS} = 0V, I_{SD} = 20A, T_j = +175°C		4.4		V
t_{rr}	Reverse Recovery Time		V_{GS} = -2/+20V, I_{SD} = 30A, V_R = 800A, di/dt = 1000A/µS, $R_{G(ext)}$ = 10Ω, L= 450µH		44.4		ns
Q_{rr}	Reverse Recovery Charge				212.6		nC
I_{RRM}	Peak Reverse Recovery Current				10.8		A

CHARACTERISTICS

Fig 1: Output Characteristics T_J = -55°C

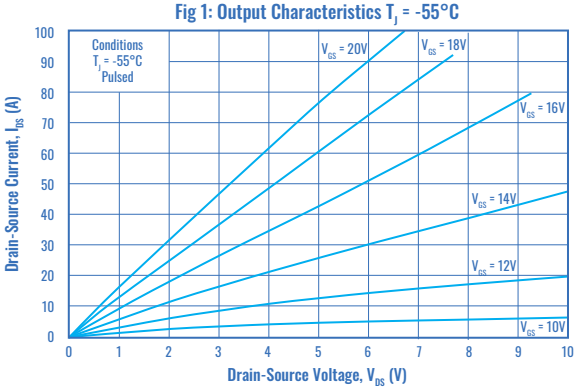


Fig 2: Output Characteristics T_J = 25°C

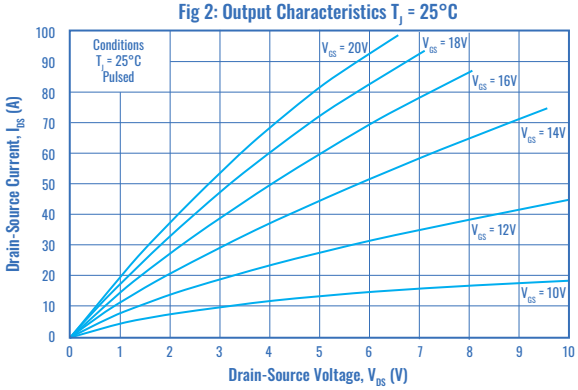


Fig 3: Output Characteristics T_J = 175°C

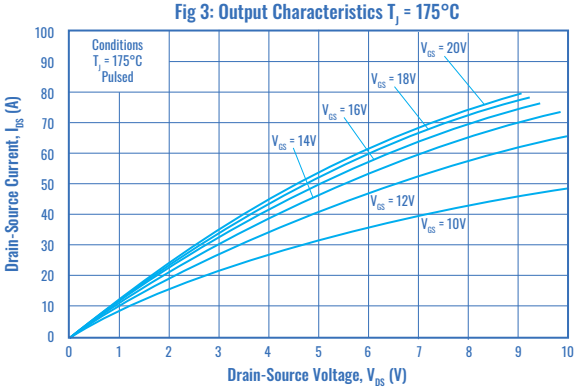


Fig 4: On-Resistance vs. Junction Temperature

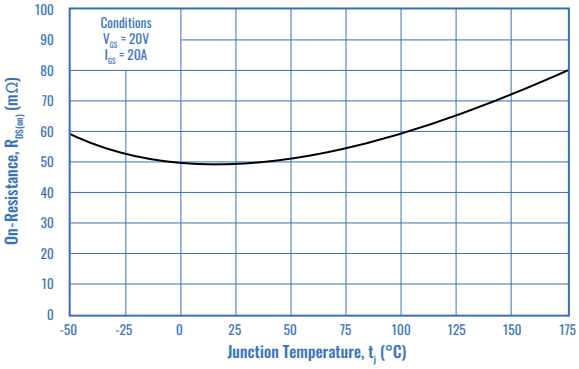


Fig 5: Normalized On-Resistance vs. Junction Temperature

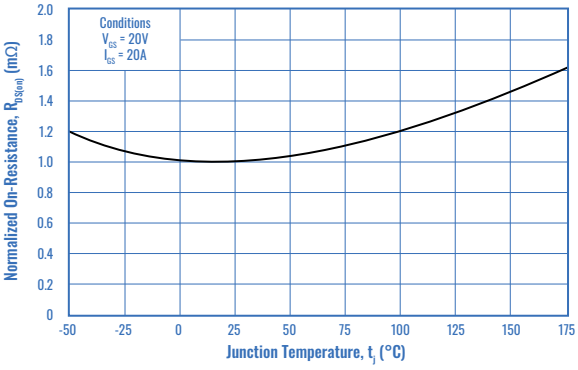


Fig 6: On-Resistance vs. Drain Current vs. Junction Temperature

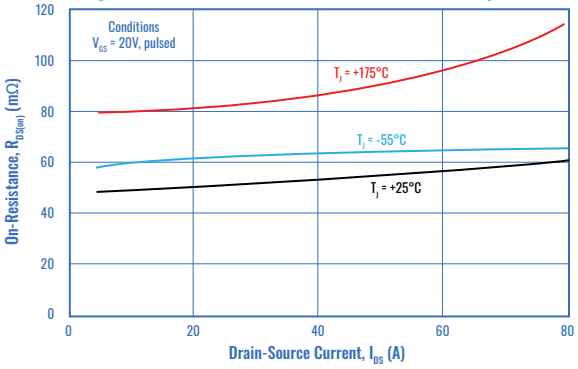


Fig 7: On-Resistance vs. Gate-Voltage vs. Junction Temperature

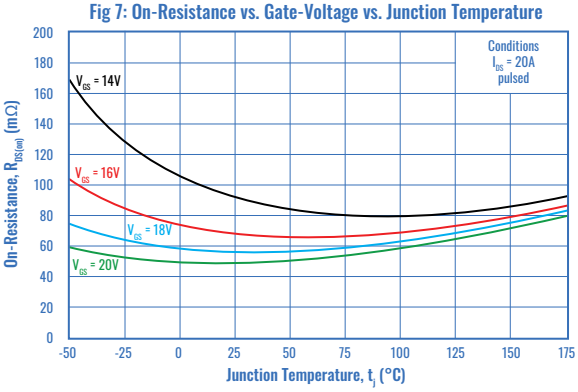
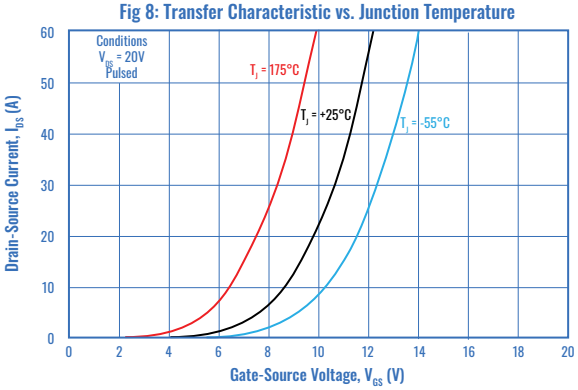


Fig 8: Transfer Characteristic vs. Junction Temperature



CHARACTERISTICS CONT.

Fig 9: Threshold Voltage vs. Temperature

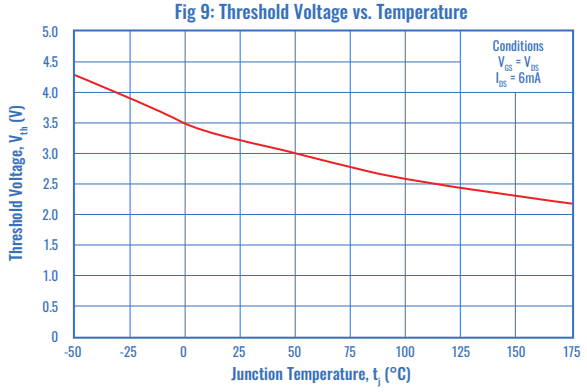


Fig 10: Body Diode Output Characteristics T_j = -55°C

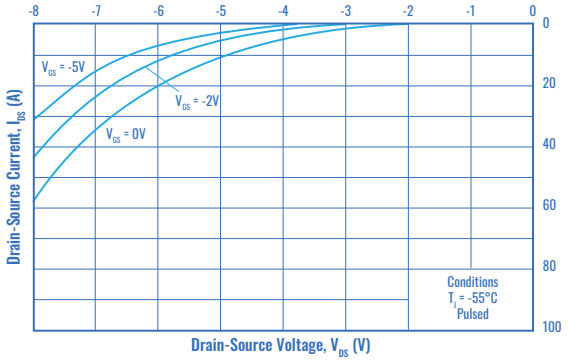


Fig 11: Body Diode Output Characteristics T_j = 25°C

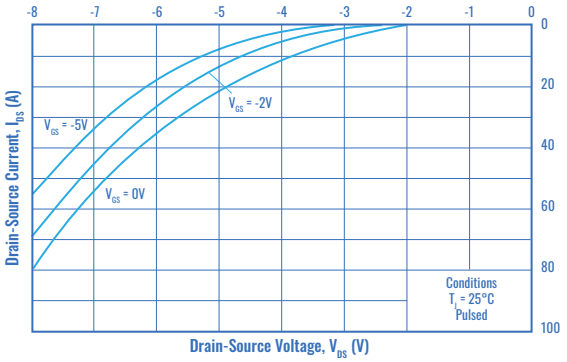


Fig 12: Body Diode Output Characteristics T_j = 175°C

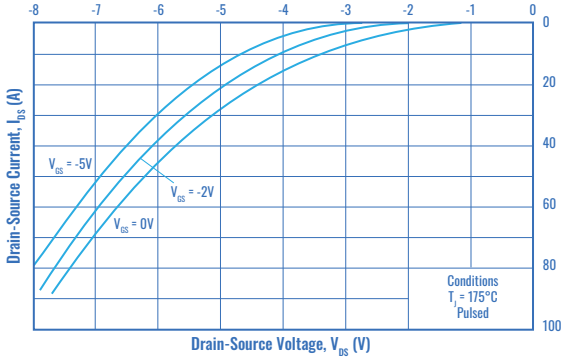


Fig 13: 3rd Quadrant Characteristics T_j = -55°C

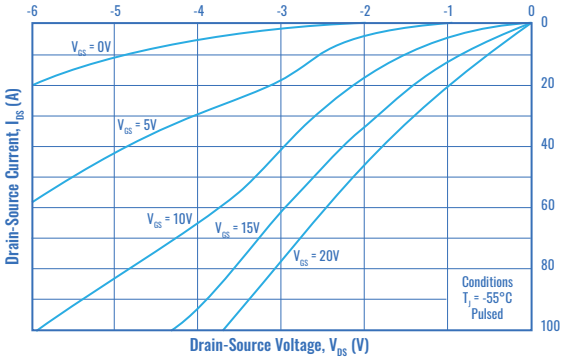


Fig 14: 3rd Quadrant Characteristics T_j = 25°C

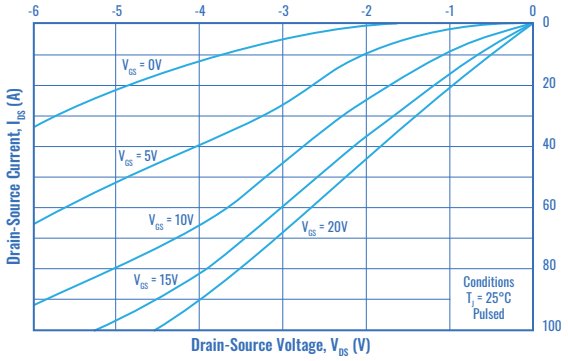


Fig 15: 3rd Quadrant Characteristics T_j = 175°C

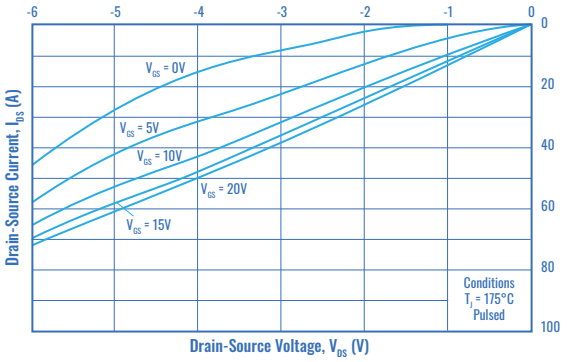
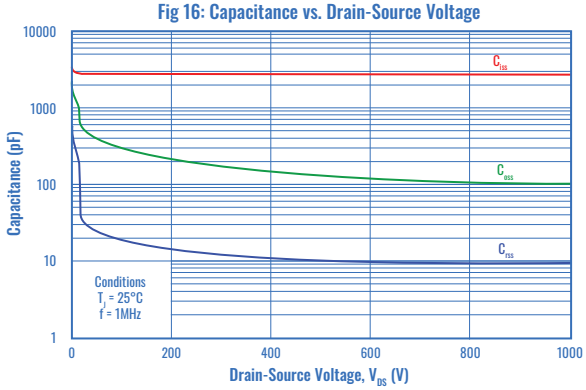


Fig 16: Capacitance vs. Drain-Source Voltage



CHARACTERISTICS CONT.

Fig 17: Output Capacitor Stored Energy vs. Drain-Source Voltage

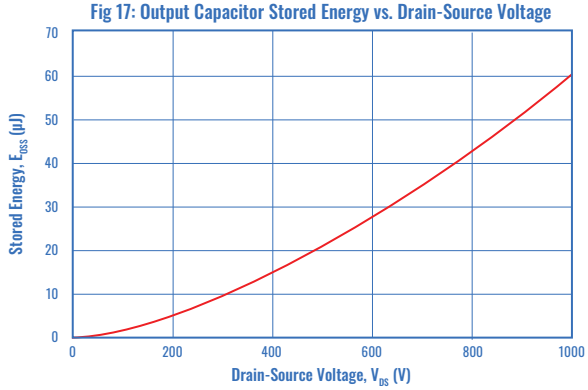


Fig 18: Gate Charge Characteristic @ 25°C

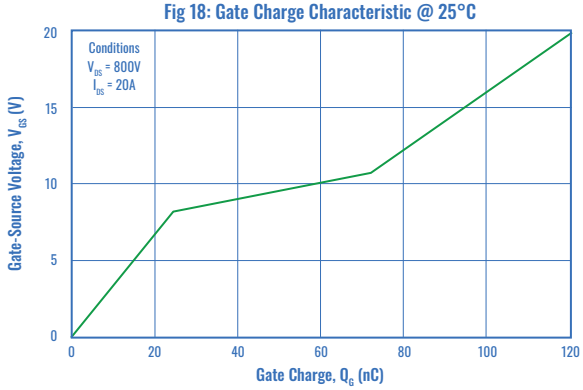


Fig 19: Switching Energy vs. External Gate Resistor, T_J = 25°C

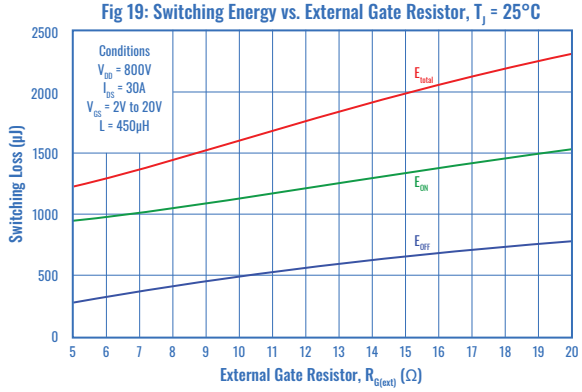


Fig 20: Switching Time vs. External Gate Resistor, T_J = 25°C

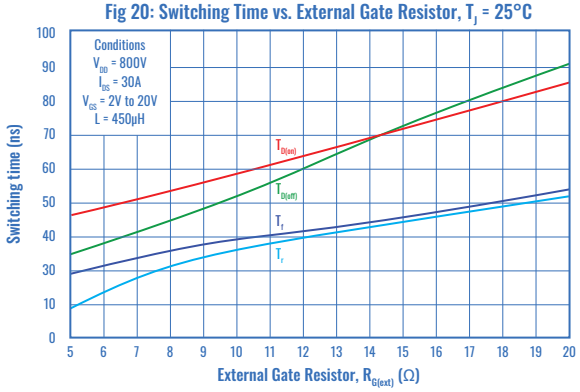


Fig 21: Continuous Drain Current vs. Case Temperature

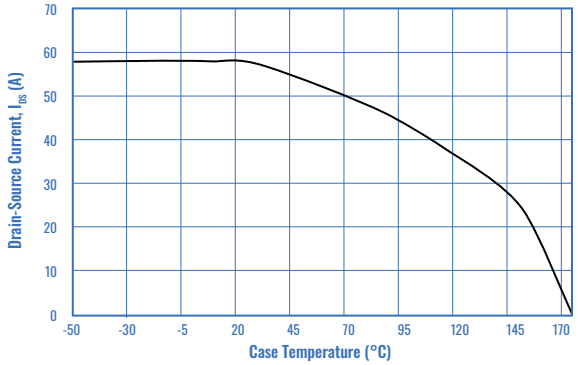


Fig 22: Max. Power Dissipation vs. Case Temperature

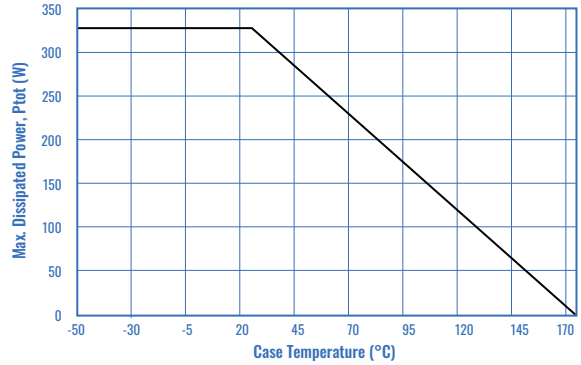


Fig 23: Thermal Impedance

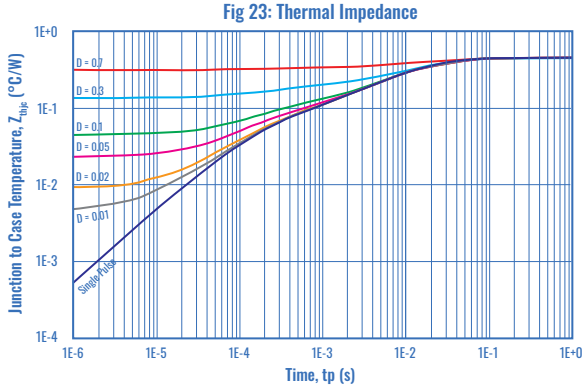
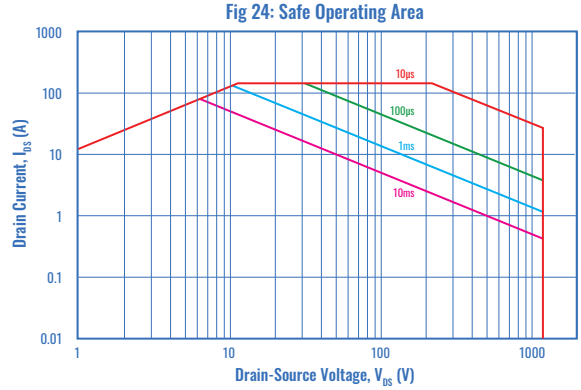
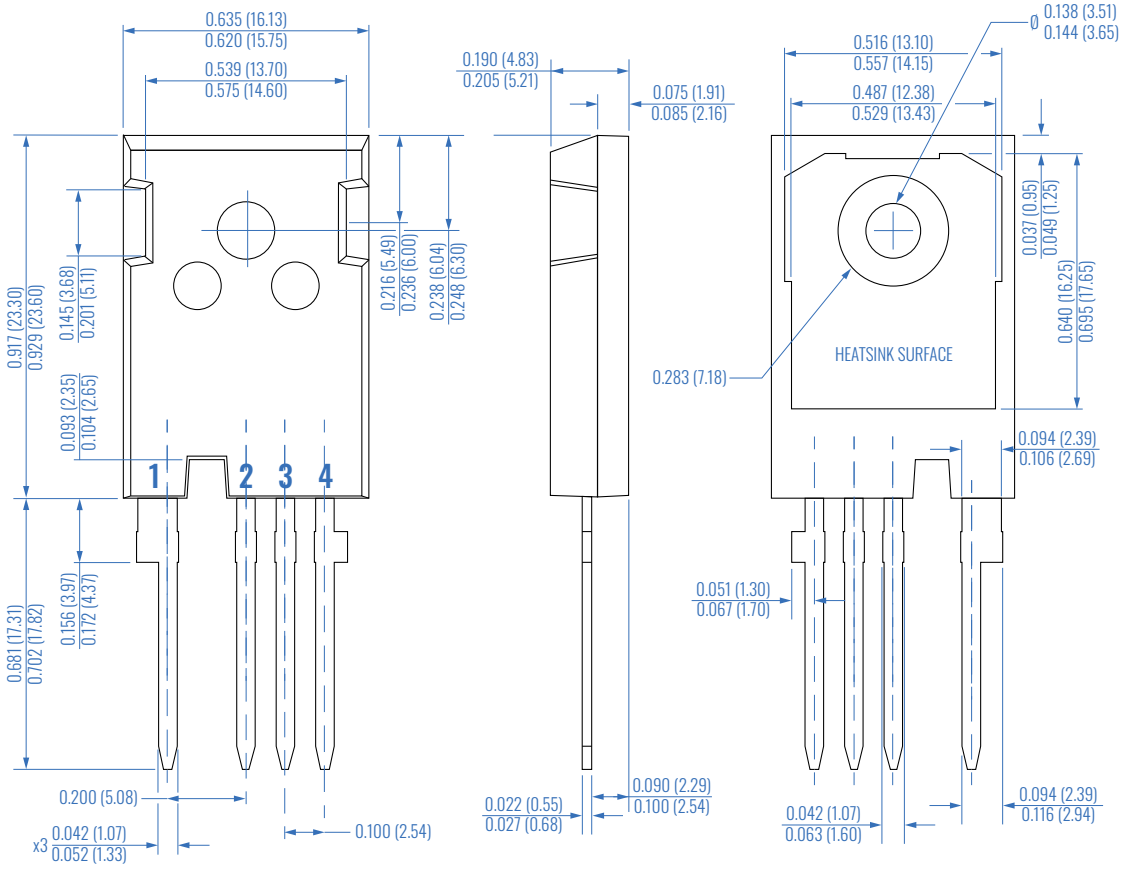


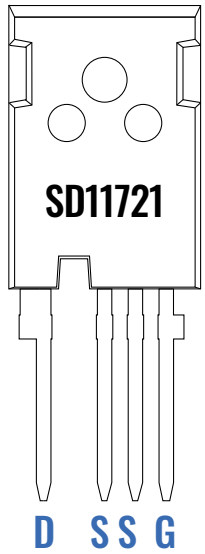
Fig 24: Safe Operating Area



OUTLINE DIMENSIONS



PIN CONNECTIONS



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