

TECHNICAL DATA
DATA SHEET D0379 REV.-

SILICON CARBIDE 1200V 55A POWER MOSFET DIE

Applications:

- Solar inverters • Switch Mode Power Supplies • High voltage DC/DC converters
- Battery charges • Mode drive • Pulsed power application

Features:

- High blocking voltage with low on-resistance
- High Speed Switching with low capacitances
- Easy to parallel and simple to drive
- Avalanche ruggedness
- Resistant to latch-up
- Silver back metal

Maximum Ratings@ $T_A=25^\circ\text{C}$ unless otherwise specified:

Characteristics	Symbol	Condition	Max.	Units
Drain - Source Voltage	V_{DSmax}	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	1200	V
Gate - Source Voltage (dynamic)	V_{GSmax}	AC ($f > 1\text{ Hz}$)	-10/+25	V
Gate - Source Voltage (static)	V_{GSop}	Static	-5/+20	V
Continuous Drain Current	I_D	$V_{GS} = 20\text{ V}, T_C = 25^\circ\text{C}$	55	A
Pulsed Drain Current	$I_{D(pulse)}$	Pulse width t_P limited by T_{jmax}	160	A
Operating Junction and Storage Temperature	T_J, T_{stg}		-55 to +175	$^\circ\text{C}$
Maximum Processing Temperature	T_{Proc}	10 min. maximum	325	$^\circ\text{C}$

- (1) When using MOSFET body diode $V_{GSmax} = -5\text{V}/+25\text{V}$
- (2) MOSFET can also safely operate at $V_{GS} = 0/+20\text{ V}$
- (3) Assumes a $R_{\theta JC} < 0.35\text{ K/W}$

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Electrical Characteristics@T_A=25°C unless otherwise specified:

Characteristics	Symbol	Condition	Min.	Typ.	Max.	Units
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 100 μA	1200			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 10mA	1.8	2.4	4	V
		V _{DS} = V _{GS} , I _D = 10mA, T _J = 175 °C		1.55		
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 1200 V, V _{GS} = 0 V		1	100	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} = 20 V, V _{DS} = 0 V			250	nA
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 20 V, I _D = 40A		45	52	mΩ
		V _{GS} = 20 V, I _D = 40 A, T _J = 175 °C		73		
Trans conductance	g _{fs}	V _{DS} = 20 V, I _{DS} = 40 A		10		S
		V _{DS} = 20 V, I _{DS} = 40 A, T _J = 175 °C		12		
Input Capacitance	C _{iss}	V _{GS} = 0 V		1904		pF
Output Capacitance	C _{oss}	V _{DS} = 1000V		108		
Reverse Transfer Capacitance	C _{rss}	f = 1 MHz		6		
C _{oss} Stored Energy	E _{oss}	V _{AC} = 25 mV		72.9		
Internal Gate Resistance	R _{G(int)}	f = 1 MHz, V _{AC} = 25 mV, ESR of C _{iss}		2.6		Ω
Gate to Source Charge	Q _{gs}	V _{DS} = 800 V, V _{GS} = -5/20 V		34.3		nC
Gate to Drain Charge	Q _{gd}	I _D = 40 A		32.1		
Total Gate Charge	Q _g	Per IEC60747-8-4 pg 83		92.1		

Revere Diode Characteristics:

Characteristics	Symbol	Condition	Typ.	Max.	Units
Diode Forward Voltage	V _{SD}	V _{GS} = - 5 V, I _{SD} = 20 A	3.6		V
		V _{GS} = - 5 V, I _{SD} = 20 A, T _J = 175 °C	3.2		V
Continuous Diode Forward Current	I _S	T _C = 25 °C	44		
Reverse Recovery Time	t _{rr}	V _{GS} = - 5 V, I _{SD} = 40 A ,T _J = 25 °C	43.4		ns
Reverse Recovery Charge	Q _{rr}	V _R = 800 V	162		nC
Peak Reverse Recovery Current	I _{rrm}	dif/dt = 1047 A/μs	8.1		A

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Typical Performance:

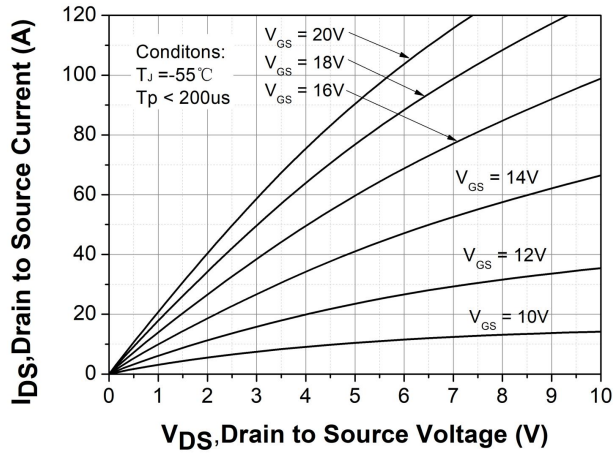


Figure 1. Output Characteristics $T_J = -55^\circ\text{C}$

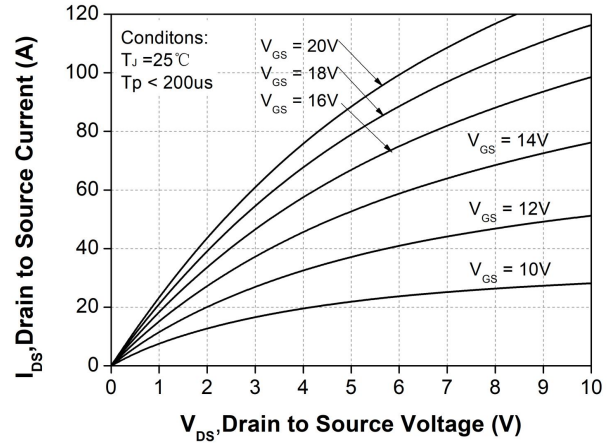


Figure 2. Output Characteristics $T_J = 25^\circ\text{C}$

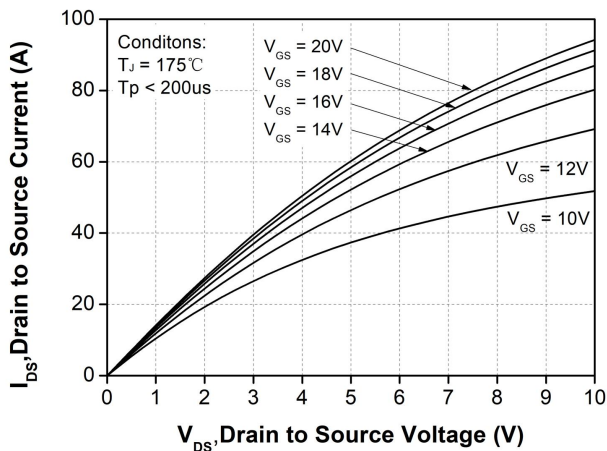


Figure 3. Output Characteristics $T_J = 175^\circ\text{C}$

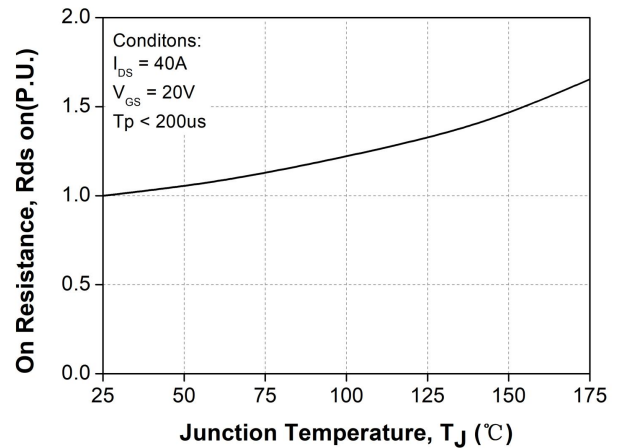


Figure 4. Normalized On-Resistance vs. Temperature

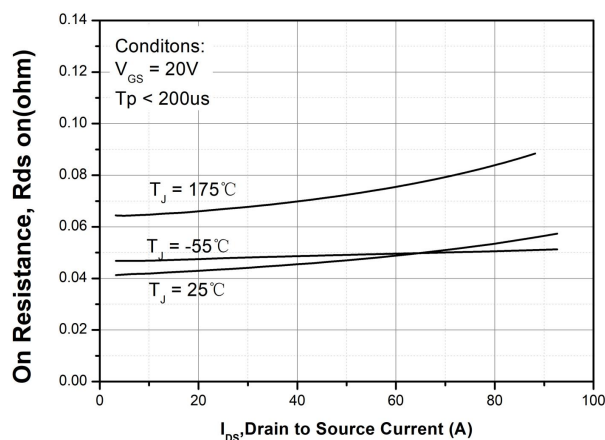


Figure 5. On-Resistance vs. Drain Current For Various Temperatures

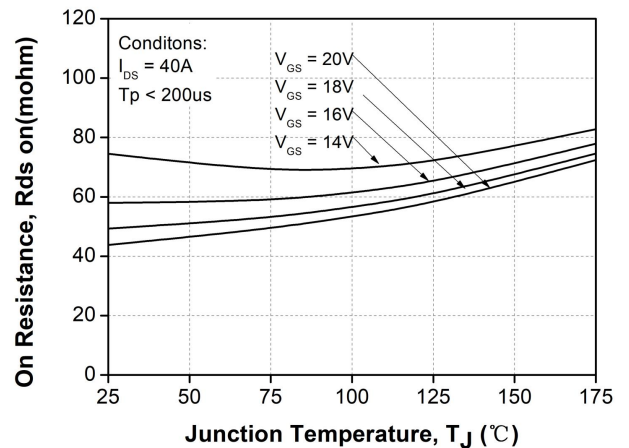


Figure 6. On-Resistance vs. Temperature For Various Gate Voltage

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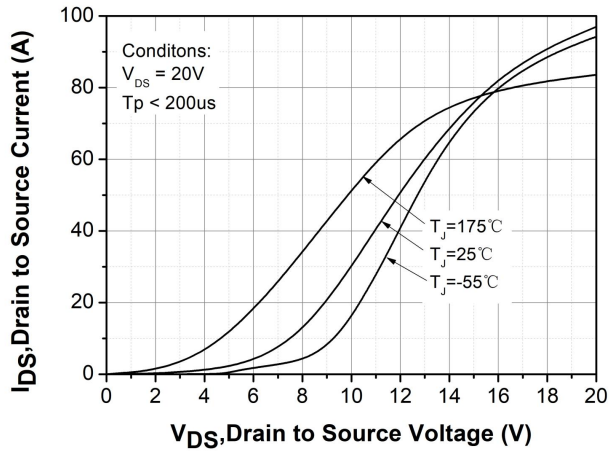


Figure 7. Transfer Characteristic for Various Junction Temperatures

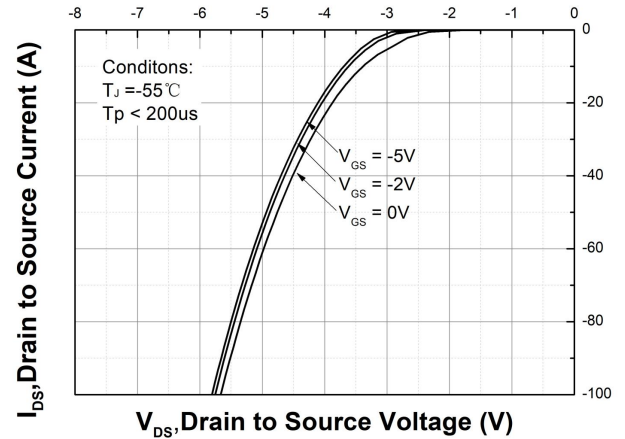


Figure 8. Body Diode Characteristic at $T_J = -55^\circ C$

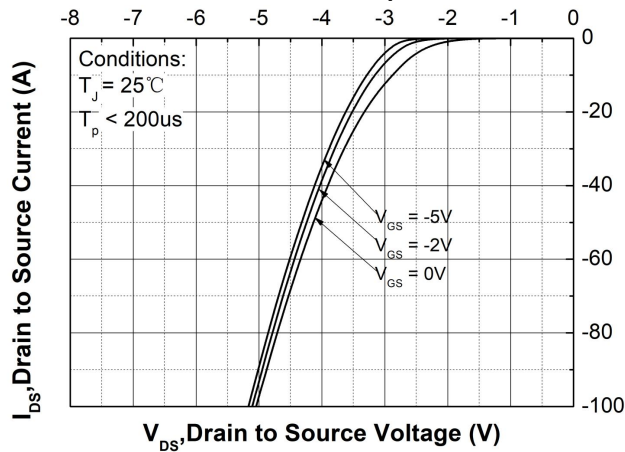


Figure 9. Body Diode Characteristic at $T_J = 25^\circ C$

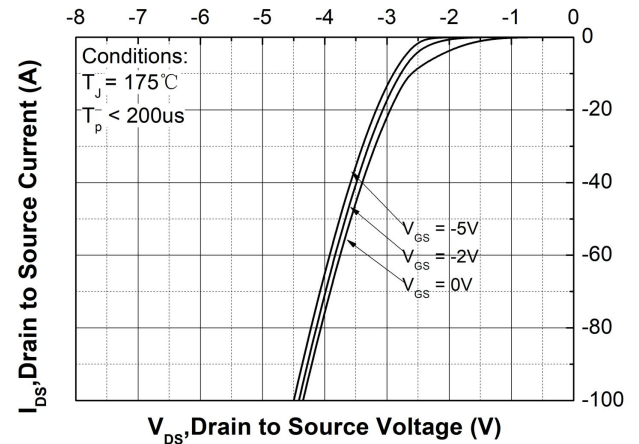


Figure 10. Body Diode Characteristic at $T_J = 175^\circ C$

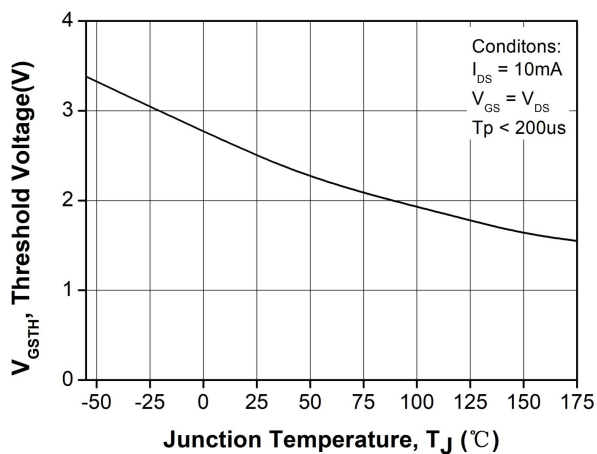


Figure 11. Threshold Voltage vs. Temperature

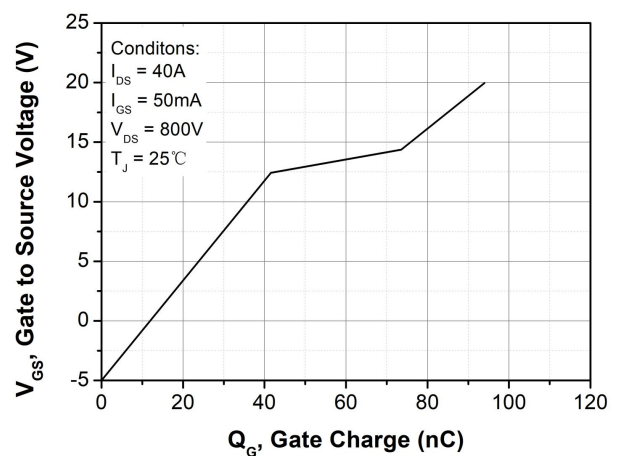


Figure 12. Gate Charge Characteristic

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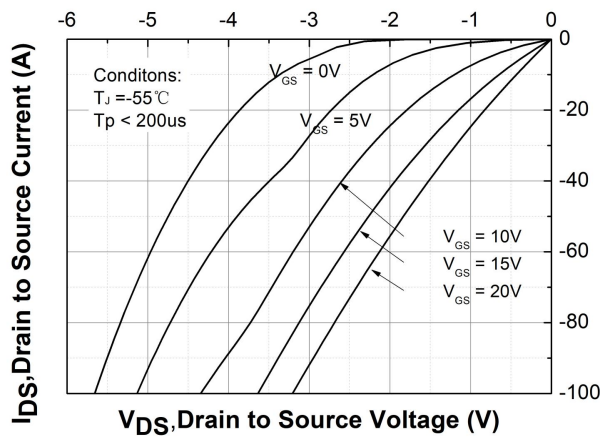


Figure 13. 3rd Quadrant Characteristic at $T_J = -55^\circ\text{C}$

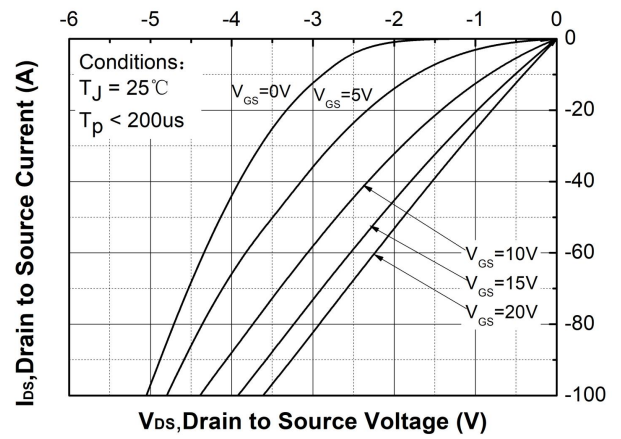


Figure 14. 3rd Quadrant Characteristic at $T_J = 25^\circ\text{C}$

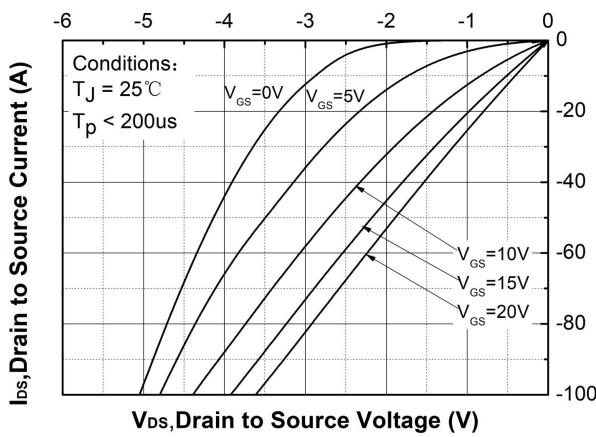


Figure 15. 3rd Quadrant Characteristic at $T_J = 175^\circ\text{C}$

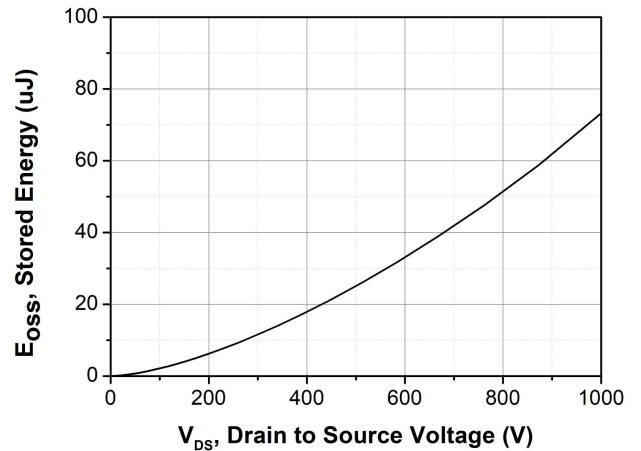


Figure 16. Output Capacitor Stored Energy

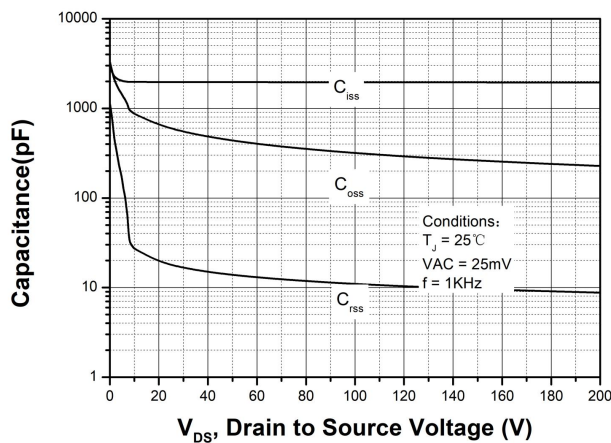


Figure 17. Capacitances vs. Drain-Source Voltage (0 - 200V)

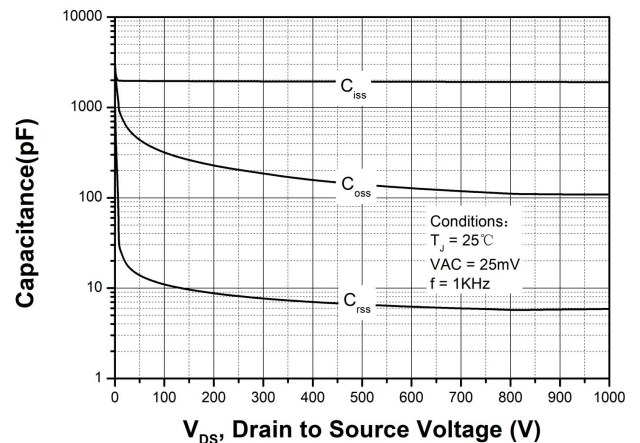
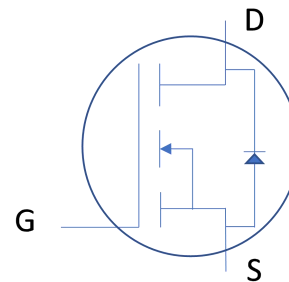


Figure 18. Capacitances vs. Drain-Source Voltage (0 - 1000V)

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Mechanical Dimensions



Parameter	Typical Value	Unit
Die Dimensions (L x W)	Please contact your sales representative to get the detailed information about die layout and dimensions.	mm
Driver Source Pad Metal Dimensions (LxW) Each		mm
Source Pad Metal Dimensions (LxW) Each		mm
Gate Pad Dimensions (L x W)		mm
Die Thickness		μm
Top Side Source metallization (Al)		μm
Bottom Drain metallization (Ni/Ag)		μm

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