MaxPower Semiconductor

MXP4004DT Datasheet

40V N-Channel MOSFET

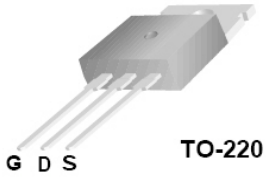
Applications:

- **Power Supply**
- **DC-DC Converters**

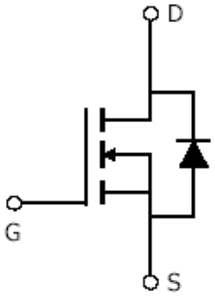
V_{DSS}	$R_{DS(ON)}$ (Max)	I_D[a]
40 V	4.0 mΩ	164 A

Features:

- **LeadFree**
- **Low $R_{DS(ON)}$ to Minimize Conductive Loss**
- **Low Gate Change for Fast Switching Application**
- **Optimized B_{VDSS} Capability**



TO-220



Ordering Information

Part Number	Package	Brand
MXP4004DT	TO220	MXP

Absolute Maximum Ratings

T_c=25℃ unless otherwise specified

Symbol	Parameter	Value	Units
V_{DS}	Drain-to-Source Voltage	40	V
I_D[a]	Continuous Drain Current (T_C=25℃)	164	A
I_{DM}	Pulsed Drain Current @V_G=10V	655	
E_{AS}	Single Pulse Avalanche Energy (L=1mH)	630	mJ
I_{AS}	Pulsed Avalanche Energy	Figure.9	A
T_J and T_{STG}	Operating Junction and Storage Temperature Range	-55 to 175	℃

a. Calculated continuous current based upon maximum allowable junction temperature, +175℃. Package limitation current is 80A.

OFF Characteristics

T_J=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	40			V	V_{GS}=0V, I_D=250μA
I_{DSS}	Drain-to-Source Leakage Current			1	μA	V_{DS}=32V, V_{GS}=0V
				100		V_{DS}=32V, V_{GS}=0V T_J=125 ℃
I_{GSS}	Gate-to-Source Forward Leakage			100	nA	V_{GS}=+20V
	Gate-to-Source Reverse Leakage			100		V_{GS}= -20V

ON Characteristics

T_J=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance		2.8	4	mΩ	V_{GS}= 10V, I_D=24A
$V_{GS(TH)}$	Gate Threshold Voltage	2		4	V	V_{DS}=V_{GS}, I_D=250μA

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
C_{iss}	Input Capacitance		4037		pF	V_{GS}=0V, V_{DS}=20V, f=1.0MHz
C_{oss}	Output Capacitance		672			
C_{rss}	Reverse Transfer Capacitance		249			
Q_g	Total Gate Charge		59		nC	V_{DD}=20V, I_D=82A, V_G=10V
Q_{gs}	Gate-to-Source Charge		21			
Q_{gd}	Gate-to-Drain (“Miller”) Charge		18			
$t_{d(on)}$	Turn-on Delay Time		16		ns	V_{DD}=20V, I_D=82A, V_G=10V, R_G=4.7Ω
t_r	Rise Time		61			
$t_{d(off)}$	Turn-off Delay Time		46			
t_f	Fall Time		27			

Source-Drain Diode Characteristics

Tc=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
V_{SD}	Diode Forward Voltage			1.2	V	I_S=24A, V_{GS}=0V
Trr	Reverse Recovery Time		49	74	ns	IS=38A, di/dt = 100A/μs
Qrr	Reverse Recovery Charge		32	48	nC	

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Figure 1. Maximum Power Dissipation V.S Case Temperature

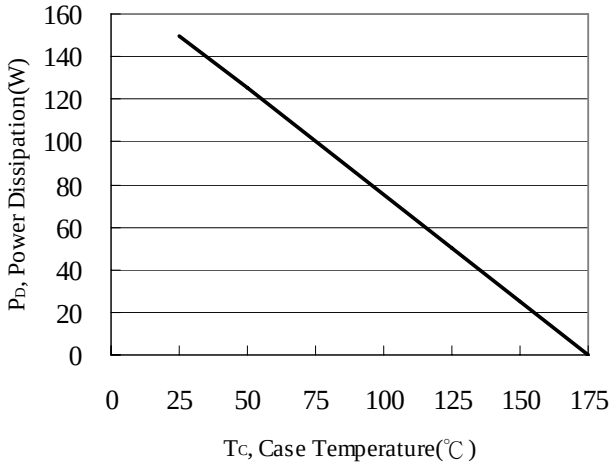


Figure 2. Maximum Continuous Drain Current V.S Case Temperature

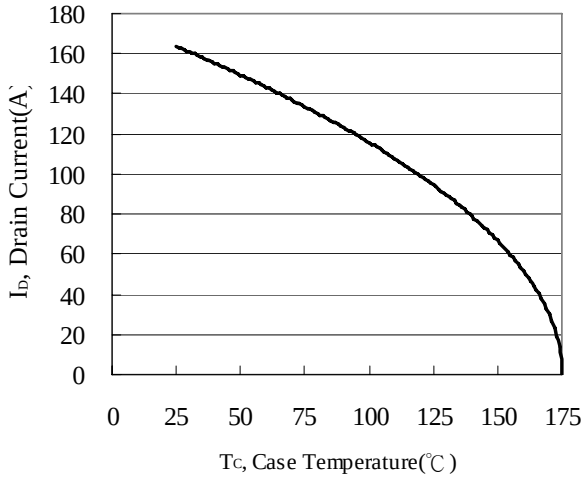


Figure 3. Typical Output Characteristics

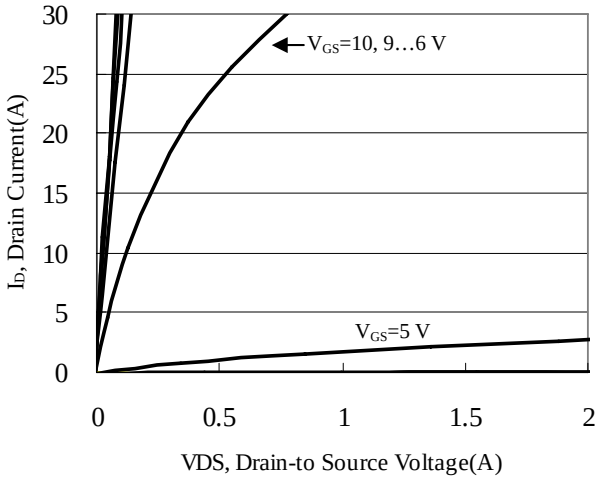


Figure 4. Breakdown Voltage V.S Junction Temperature

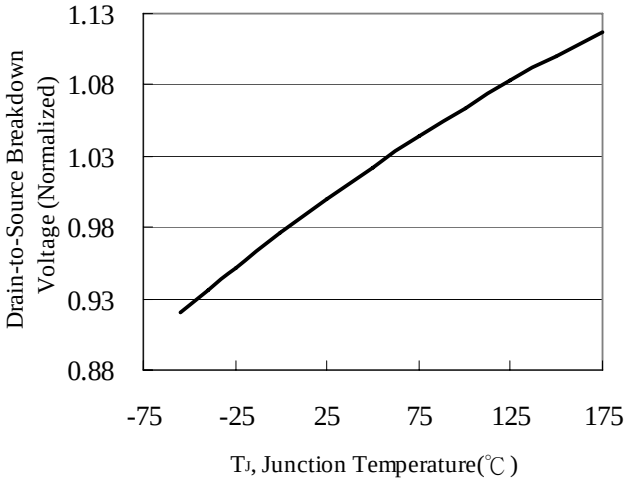


Figure 5. Threshold Voltage V.S Junction Temperature

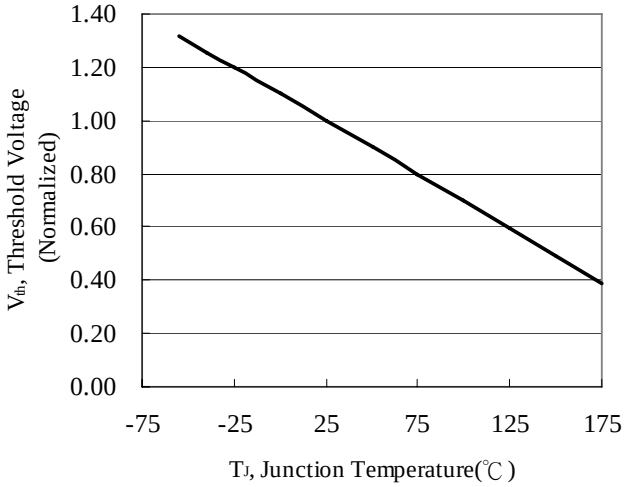


Figure 6. Drain-to-Source Resistance V.S Junction Temperature

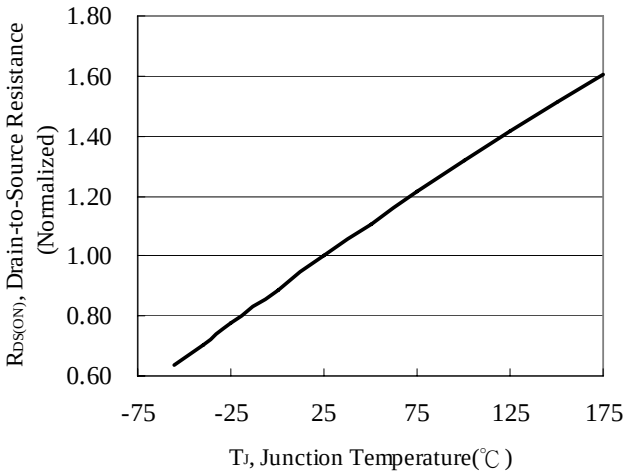


Figure 7. Typical Gate Charge vs. Gate-to-Source Voltage

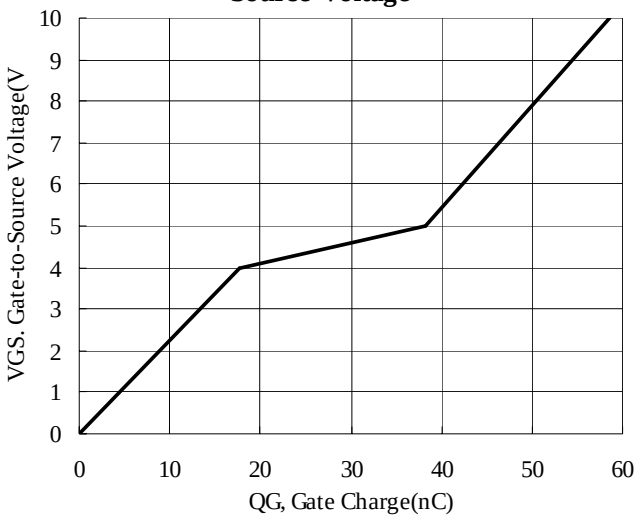


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

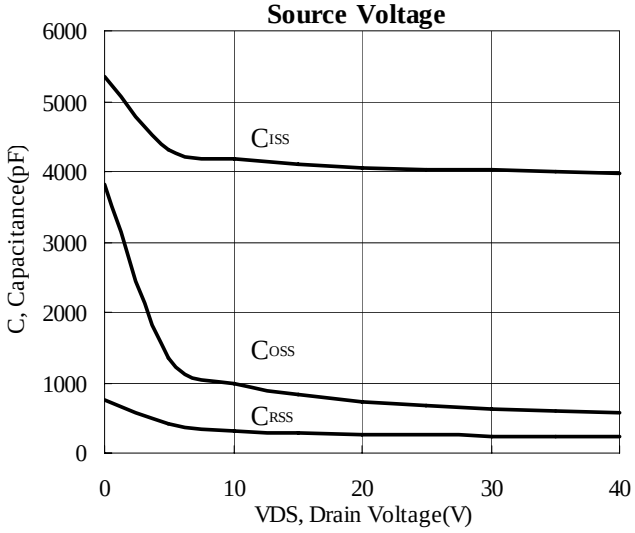


Figure 9. Unclamped Inductive Switching Capability

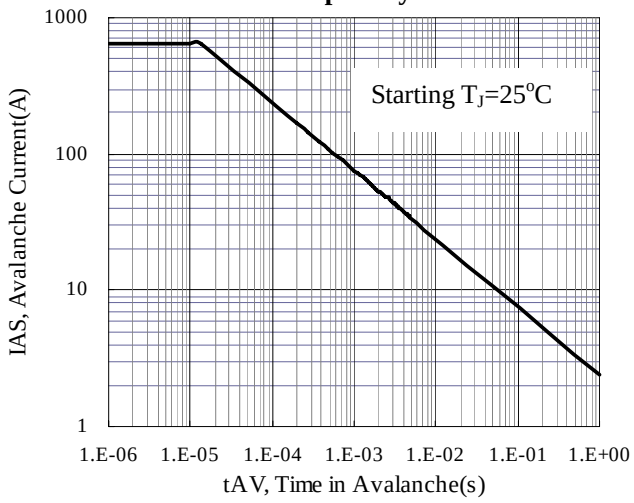
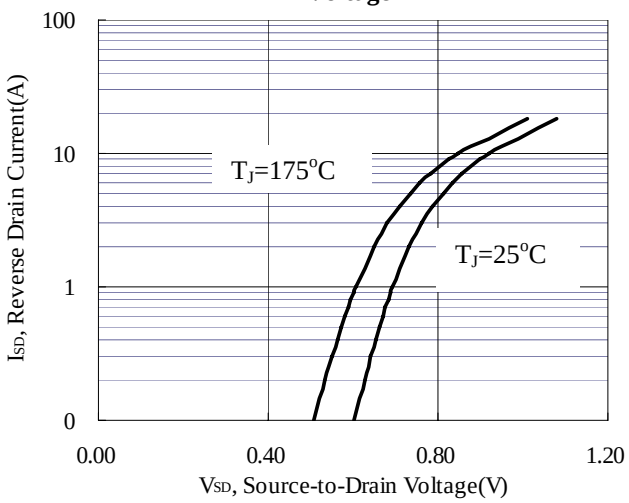


Figure 10. Source-Drain Diode Forward Voltage



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