

40V N-Channel MOSFET

Applications:

- Power Supply
- DC-DC Converters

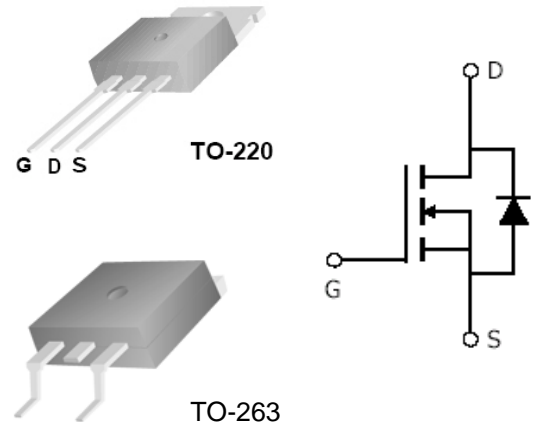
V_{DSS}	$R_{DS(ON)}$ (Max)	I_D^a
40 V	4.0 m Ω	173 A

Features:

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

Ordering Information

Part Number	Package	Brand
MXP4004BT	TO220	MXP
MXP4004BE	TO263	MXP



Absolute Maximum Ratings

$T_c=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Value	Units
V_{DS}	Drain-to-Source Voltage	40	V
I_D^a	Continuous Drain Current ($T_c=25^\circ\text{C}$)	173	A
I_{DM}	Pulsed Drain Current @ $V_G=10\text{V}$	693	
E_{AS}	Single Pulse Avalanche Energy ($L=1\text{mH}$)	724	mJ
I_{AS}	Pulsed Avalanche Energy	Figure.9	A
T_J and T_{STG}	Operating Junction and Storage Temperature Range	-55 to 175	$^\circ\text{C}$

a. Calculated continuous current based upon maximum allowable junction temperature, $+175^\circ\text{C}$. Package limitation current is 80A.

OFF Characteristics

$T_J=25^\circ\text{C}$ unless otherwise specified

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

ON Characteristics

$T_J=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance		2.5	4	m Ω	$V_{GS}=10\text{V}$, $I_D=24\text{A}$
$V_{GS(TH)}$	Gate Threshold Voltage	2		4	V	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
C_{ISS}	Input Capacitance		5016		pF	$V_{GS}=0\text{V}$, $V_{DS}=20\text{V}$, $f=1.0\text{MHz}$
C_{OSS}	Output Capacitance		787			
C_{RSS}	Reverse Transfer Capacitance		292			
Q_g	Total Gate Charge		70		nC	$V_{DD}=20\text{V}$, $I_D=86\text{A}$, $V_G=10\text{V}$
Q_{gs}	Gate-to-Source Charge		24			
Q_{gd}	Gate-to-Drain ("Miller") Charge		24			
$t_{d(on)}$	Turn-on Delay Time		19		ns	$V_{DD}=20\text{V}$, $I_D=86\text{A}$, $V_G=10\text{V}$, $R_G=4.7\Omega$
t_r	Rise Time		67			
$t_{d(off)}$	Turn-off Delay Time		49			
t_f	Fall Time		31			

Source-Drain Diode Characteristics

$T_c=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
V_{SD}	Diode Forward Voltage			1.2	V	$I_S=24\text{A}$, $V_{GS}=0\text{V}$
T_{rr}	Reverse Recovery Time		51	77	ns	$I_S=38\text{A}$, $di/dt = 100\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge		35	53	nC	

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Figure 1. Maximum Power Dissipation V.S Case Temperature

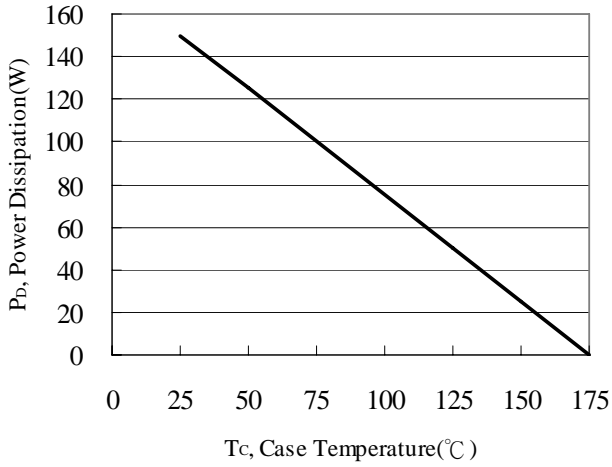


Figure 2. Maximum Continuous Drain Current V.S Case Temperature

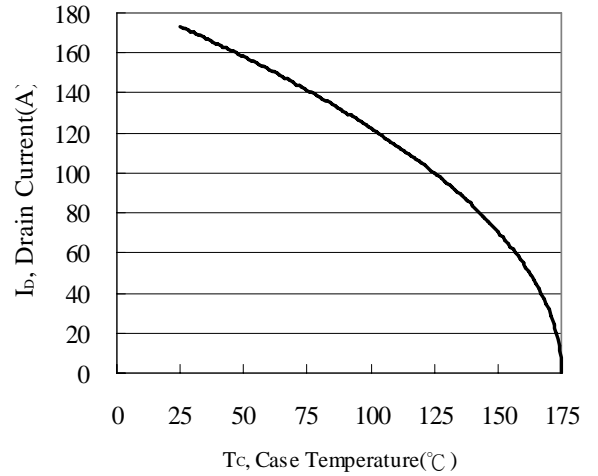


Figure 3. Typical Output Characteristics

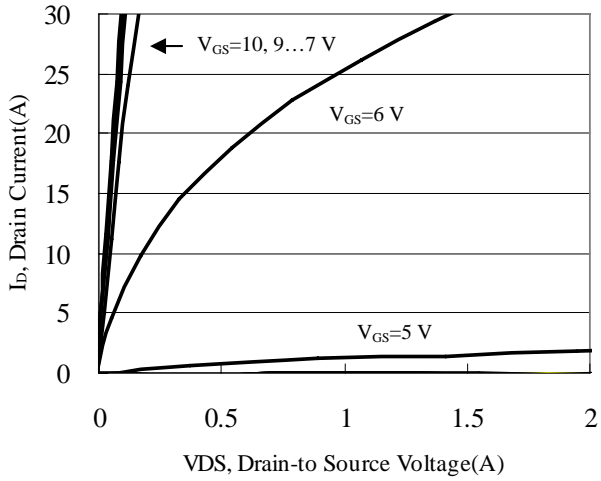


Figure 4. Breakdown Voltage V.S Junction Temperature

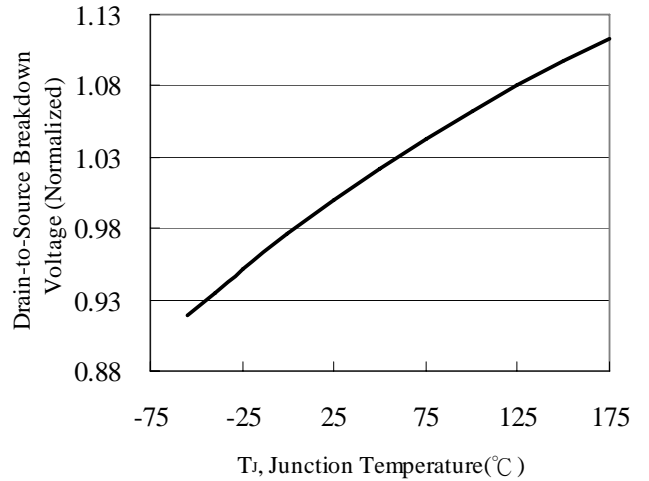


Figure 5. Threshold Voltage V.S Junction Temperature

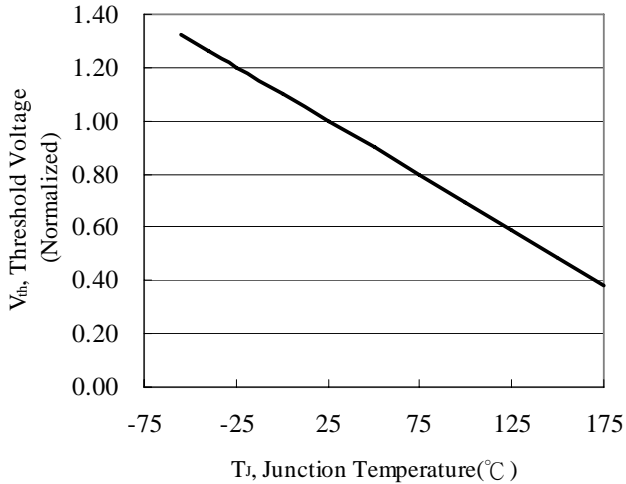


Figure 6. Drain-to-Source Resistance V.S Junction Temperature

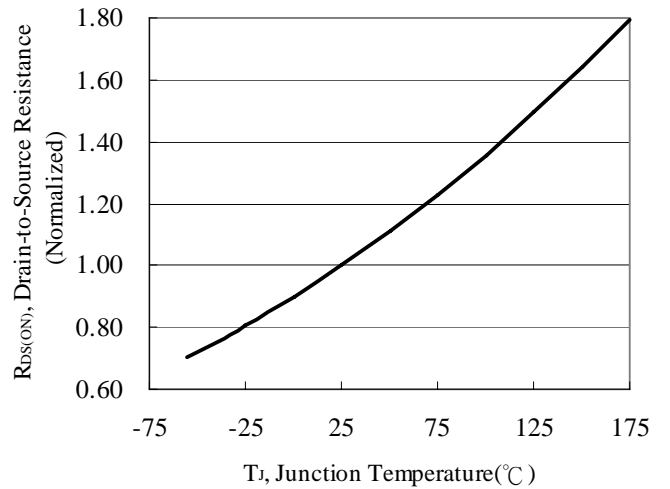


Figure 7. Typical Gate Charge vs. Gate-to-Source Voltage

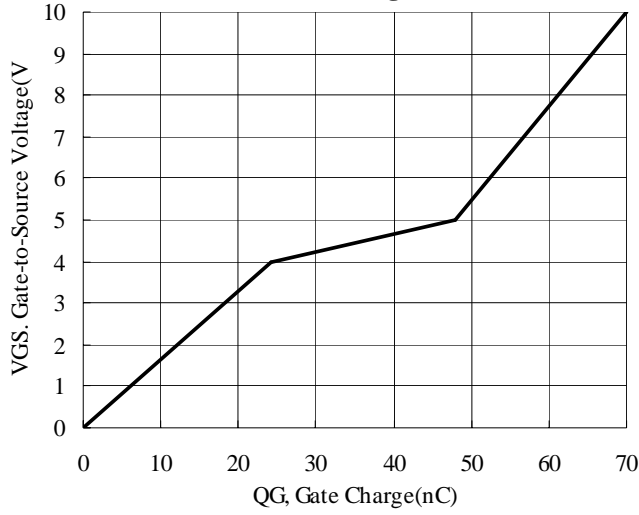


Figure 8. Typical Capacitance vs. Drain-to-Source Voltage

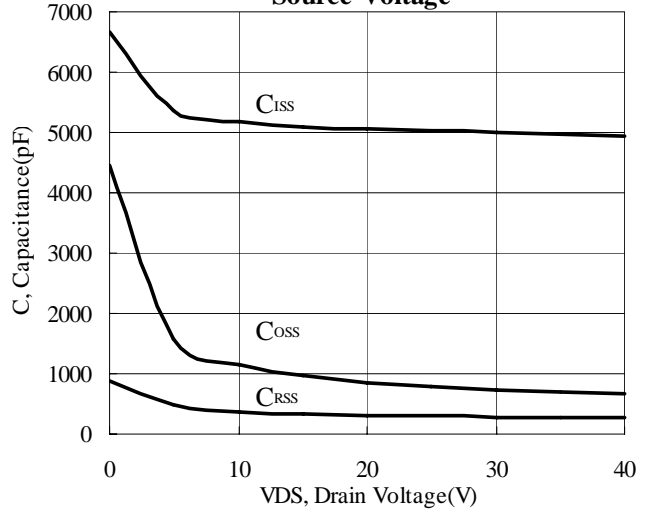


Figure 9. Unclamped Inductive Switching Capability

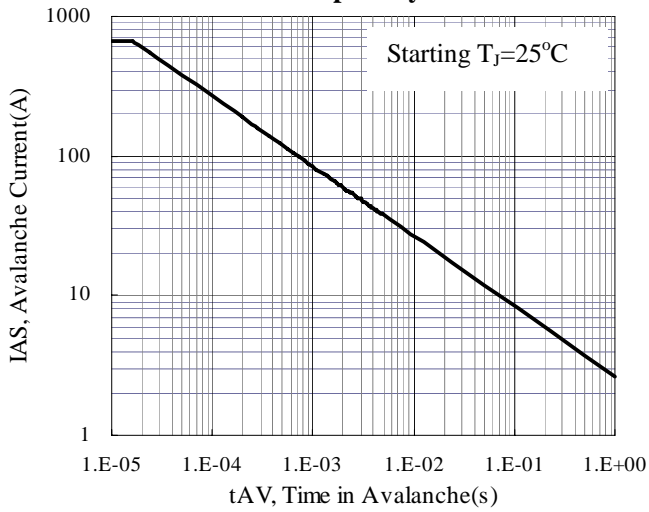
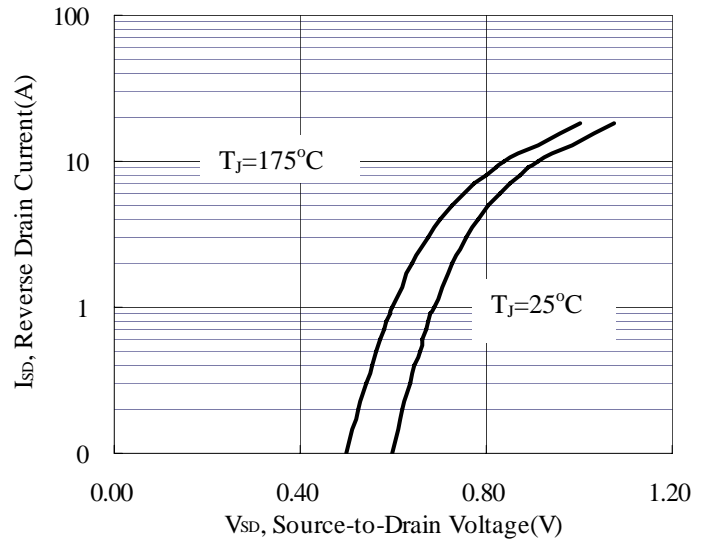


Figure 10. Source-Drain Diode Forward Voltage



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