![MaxPower Semiconductor logo]

40V N-ch Power MOSFET

General Features

➢ Proprietary New Trench Technology
➢ Ultra-low Miller Charge
➢ $R_{DS(ON),typ.}$=1.9mΩ@V_{GS}=10V
➢ Low Gate Charge Minimize Switching Loss
➢ Fast Recovery Body Diode

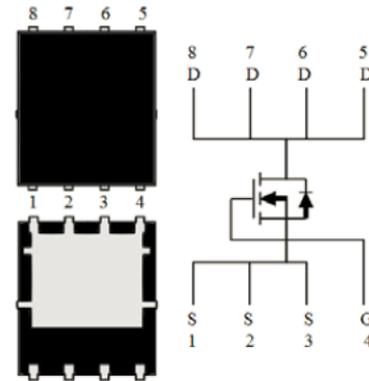| BV_{DSS}	$R_{DS(ON),max.}$	I_D
40V	2.5mΩ	30A

Applications

➢ High efficiency DC/DC Converters
➢ Synchronous Rectification
➢ Motor Drive

Ordering Information

PartNumber	Package	Marking
MXP40N2P5UG	PDFN(5x6)	MXP40N2P5UG

Absolute Maximum Ratings

T_A=25℃ unless otherwise specified

Symbol	Parameter	Value	Unit
V_{DSS}	Drain-to-Source Voltage[1]	40	V
V_{GSS}	Gate-to-Source Voltage	±20	
I_D	Continuous Drain Current atT_C=25℃	146	A
	Continuous Drain Current	30	
	Continuous Drain Current at T_A=100℃	19.1	
I_{DM}	Pulsed Drain Current at V_{GS}=10V[2]	120	
E_{AS}	Single Pulse Avalanche Energy (V_{DD}=20V, V_{GS}=10V, R_G=25Ω, L=0.2mH)	136	mJ
P_D	Power Dissipation at T_C=25℃	104	W
	Power Dissipation	4.5	W
	Derating Factor above 25℃	0.036	W/℃
T_J& T_{STG}	Operating and StorageTemperatureRange	-55 to 150	℃

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{θJC}$	Thermal Resistance, Junction-to-Case	1.2	℃/W
$R_{θJA}$	Thermal Resistance, Junction-to-Ambient	28	

Electrical Characteristics

OFF Characteristics

T_A=25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	40			V	V_{GS}=0V, I_D=250uA
I_{DSS}	Drain-to-Source Leakage Current			5	uA	V_{DS}=40V, V_{GS}=0V
I_{GSS}	Gate-to-Source Leakage Current			±100	nA	V_{GS}=±20V, V_{DS}=0V

ON Characteristics

T_A =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	2.4	3.0	mΩ	V_{GS}=4.5V, I_D=30A[3]
		--	1.9	2.5	mΩ	V_{GS}=10V, I_D=30A[3]
$V_{GS(TH)}$	Gate Threshold Voltage	1.0	1.8	3.0	V	V_{DS} = V_{GS}, I_D=250uA

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance		4230		pF	V_{GS}=0V, V_{DS}=20V, f=1.0MH$_Z$
C_{rss}	Reverse Transfer Capacitance		190			
C_{oss}	Output Capacitance		680			
R_G	Gate Series Resistance		1.5		Ω	f=1.0MH$_Z$
Q_g	Total Gate Charge		56.8		nC	V_{DD}=20V, I_D=30A, V_{GS}=10V
Q_g	Total Gate Charge		28.6			V_{DD}=20V, I_D=30A, V_{GS}=4.5V
Q_{gs}	Gate-to-Source Charge		12.1			
Q_{gd}	Gate-to-Drain (Miller) Charge		7.9			

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(on)}$	Turn-on Delay Time		24.2		ns	V_{DD}=20V, I_D=30A, V_{GS}=10V, R_G=10Ω
t_{rise}	Rise Time		19.8			
$t_{d(off)}$	Turn-off Delay Time		89.7			
t_{fall}	Fall Time		38.3			

Source-Drain Body Diode Characteristics

T_A=25℃ unless otherwise specified

| Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
V_{SD}	Diode Forward Voltage		0.77	1.2	V	I_S=30A, V_{GS}=0V
t_{rr}	Reverse Recovery Time		42		ns	V_{GS}=0V, I_F=30A,di/dt=100A/µs
Q_{rr}	Reverse Recovery Charge		47		nC	

Note:

[1] T_J=+25℃ to +150℃
[2] Repetitive rating, pulse width limited by both maximum junction temperature.
[3] Pulse width≤380µs; duty cycle≤2%.

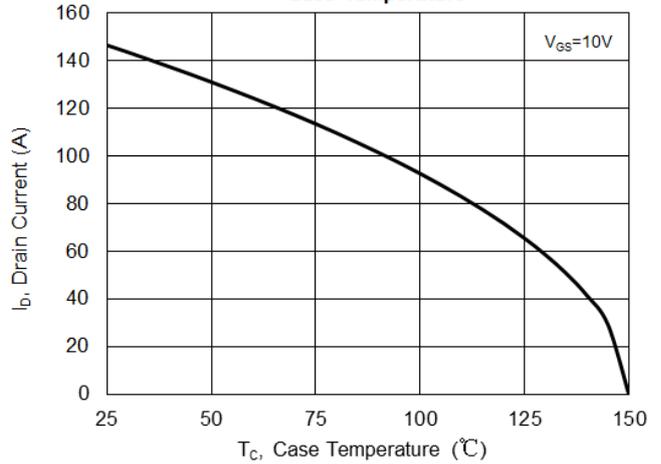## Typical Characteristics T_J=25℃ unless otherwise specified

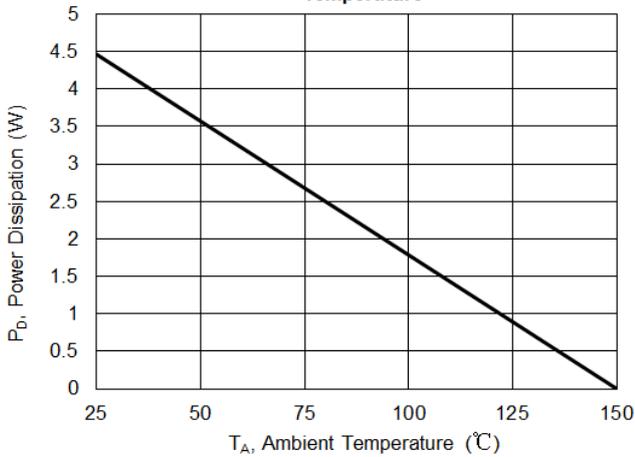### Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case
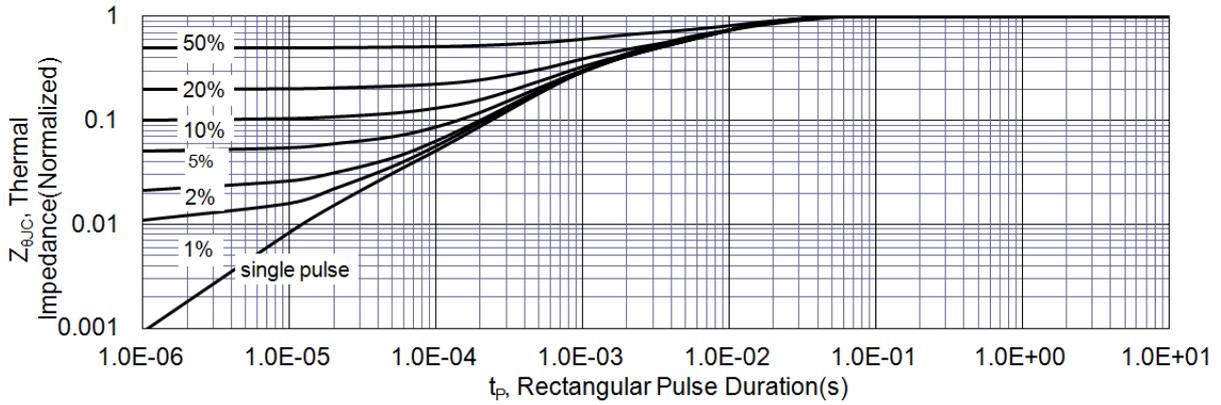
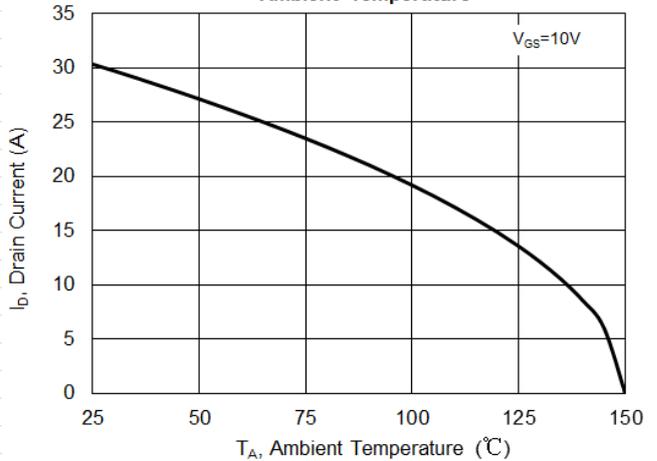### Figure 2A. Maximum Power Dissipation vs. Case Temperature
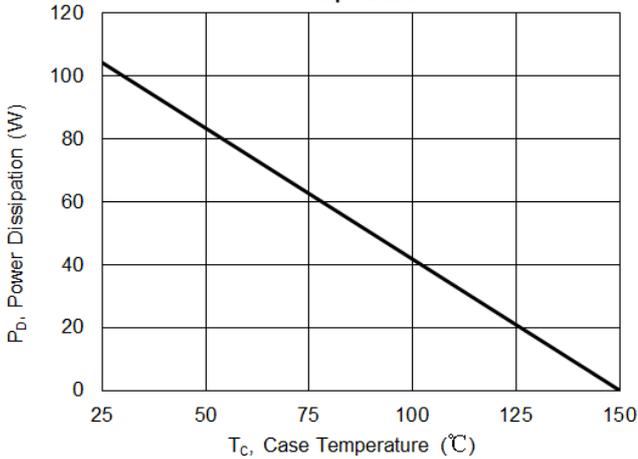
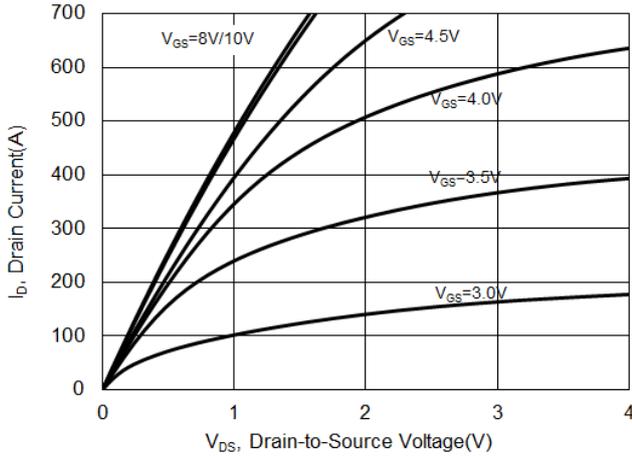### Figure 3A. Maximum Continuous Drain Current vs Case Temperature

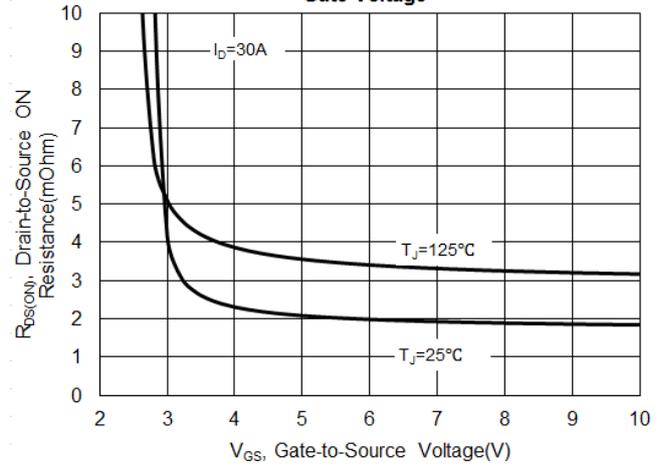### Figure 2. Maximum Power Dissipation vs. Ambient Temperature

Figure 3. Maximum Continuous Drain Current vs Ambient Temperature
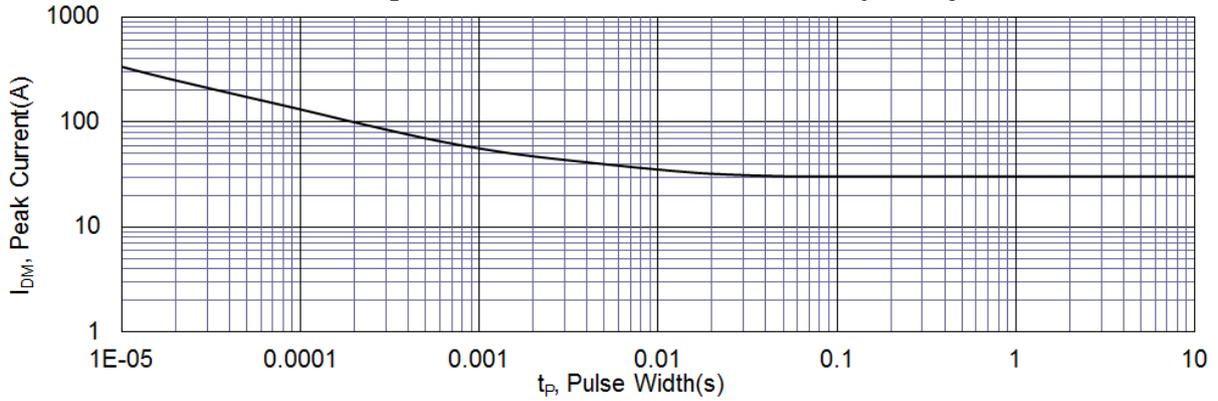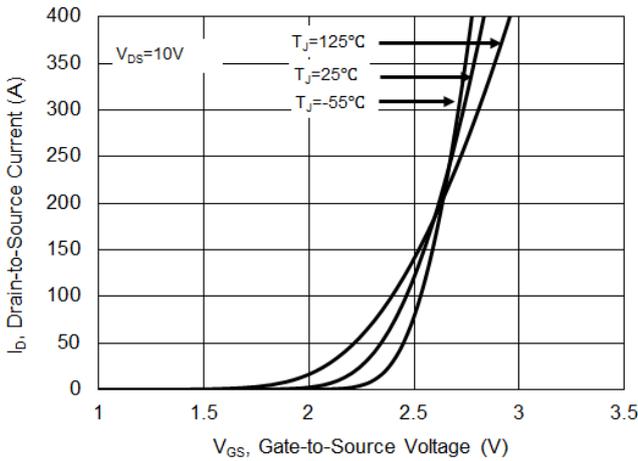
Figure 4. Typical Output Characteristics

Figure 5. Typical Drain-to-Source ON Resistance vs. Gate Voltage
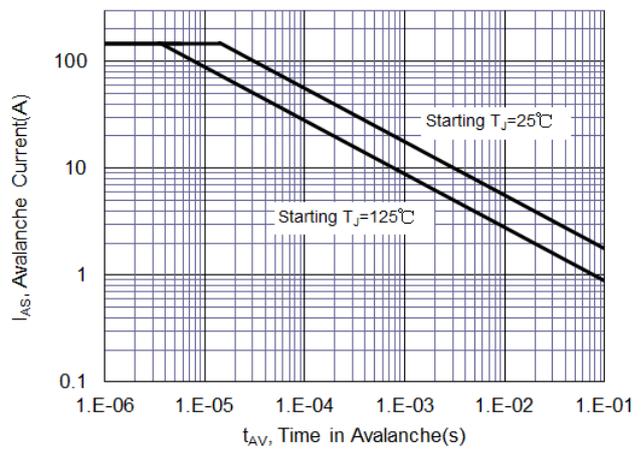

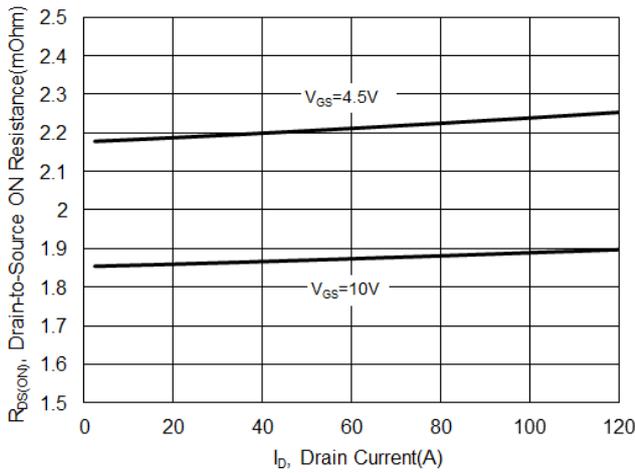**Figure 6. Maximum Peak Current Capability**

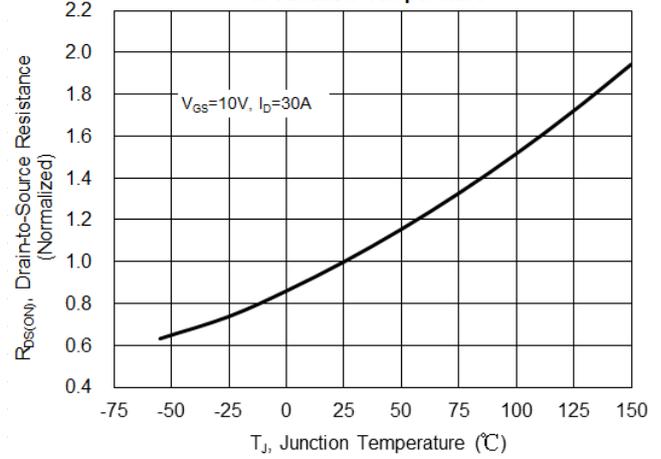**Figure 7. Typical Transfer Characteristics**
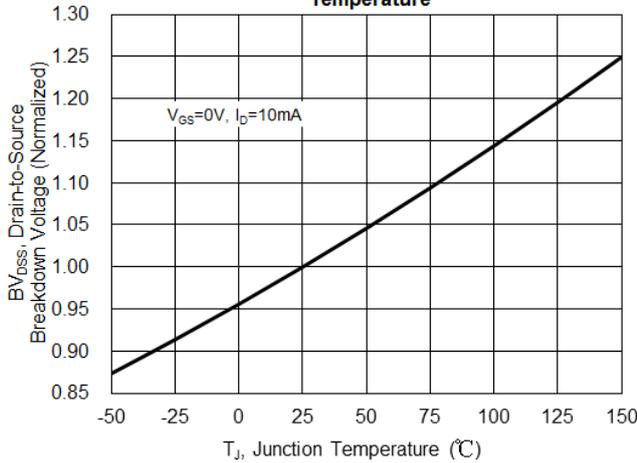

Figure 8. Unclamped Inductive Switching Capability
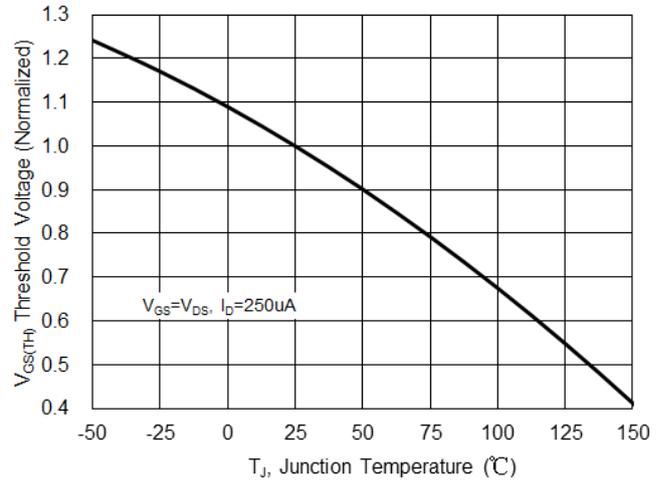
Figure 9. Typical Drain-to-Source ON Resistance

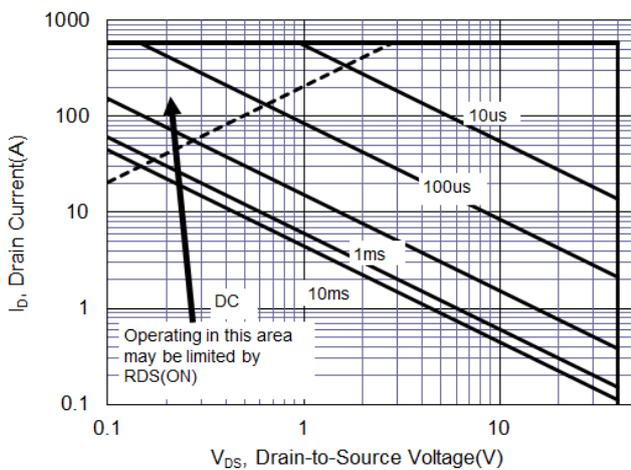Figure 10. Typical Drain-to-Source On Resistance vs. Junction Temperature

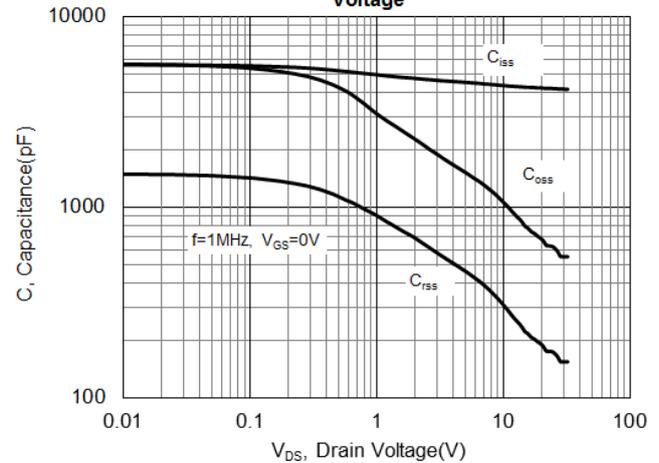Figure 11. Typical Breakdown Voltage vs. Junction Temperature

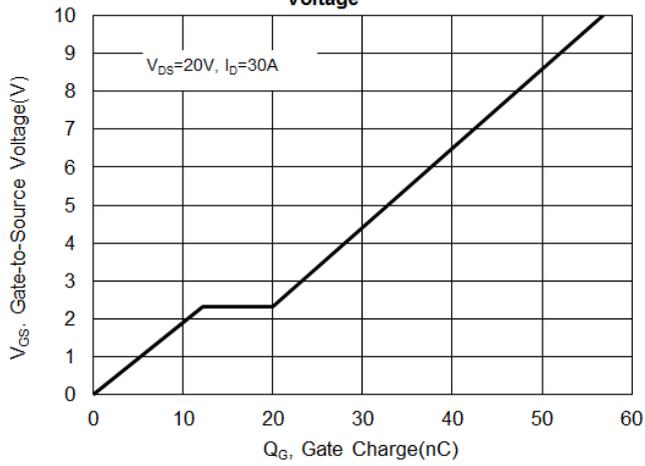Figure 12. Typical Threshold Voltage vs. Junction Temperature

Figure 13. Maximum Forward Safe Operation Area
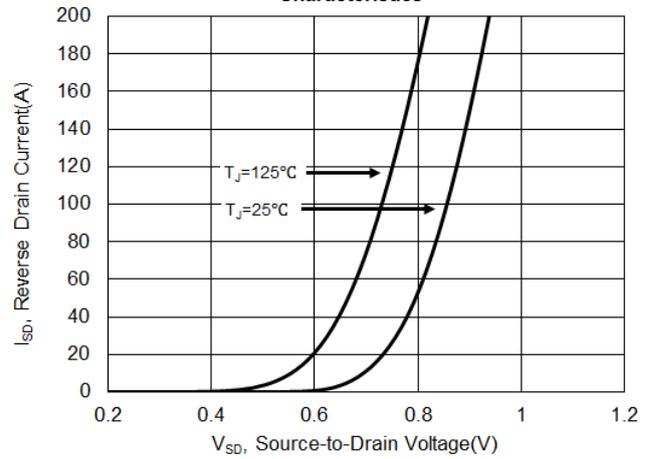

Figure 14. Typical Capacitance vs. Drain-to-Source Voltage

Figure 15. Typical Gate Charge vs. Gate-to-Source Voltage

Figure 16. Typical Body Diode Transfer Characteristics

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