



MPC09N20A

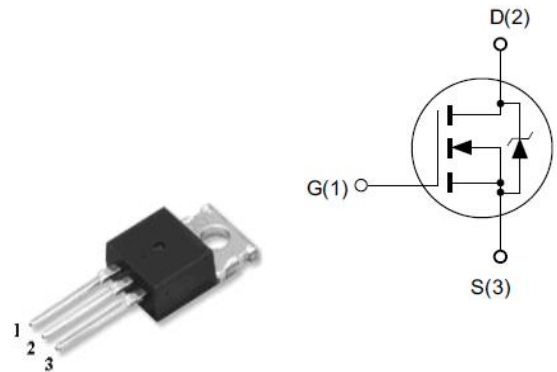
N-Channel Power MOSFET

Features

- ◆ 200V, 9A, $R_{DS(ON)}(Typ.) = 0.23\Omega @ V_{GS} = 10V$.
- ◆ Low C_{rss}
- ◆ Fast Switching
- ◆ 100% Avalanche Tested

Application

- ◆ High efficiency switch mode power supplies
- ◆ Electronic lamp ballasts based on half bridge
- ◆ UPS



Absolute Maximum Ratings $T_c = 25^\circ C$ unless otherwise noted

Symbol	Parameter	Rating	Unit
V_{DS}	Drain-Source Voltage ^a	200	V
V_{GS}	Gate-Source Voltage	± 30	V
I_D	Drain Current-Continuous, $T_C = 25^\circ C$	9	A
	Drain Current-Continuous, $T_C = 100^\circ C$	6	A
I_{DM}	Drain Current-Pulsed ^b	36	A
P_D	Maximum Power Dissipation @ $T_J = 25^\circ C$	139	W
dv/dt	Peak Diode Recovery dv/dt ^c	5	V/ns
E_{AS}	Single Pulsed Avalanche Energy ^d	157	mJ
T_J, T_{STG}	Operating and Store Temperature Range	150, -55 to 150	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction to Case	0.9	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	69	$^\circ C/W$

Electrical Characteristics $T_J = 25^\circ C$ unless otherwise noted

■ Off Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	200	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 200V, V_{GS} = 0V$	-	-	1	μA
I_{GSS}	Forward Gate Body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 30V$	-	-	± 100	nA



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■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	2.0	-	4.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = 10V, I_D = 4.5A$	-	0.23	0.28	Ω

■ Dynamic Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	$V_{DS} = 100V,$ $V_{GS} = 0V,$ $f = 1.0MHz$	-	575	-	pF
C_{oss}	Output Capacitance		-	54	-	pF
C_{rss}	Reverse Transfer Capacitance		-	10.9	-	pF

■ On Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = 100V, I_D = 9A,$ $V_{GS} = 10V$	-	8.8	-	ns
t_r	Turn-On Rise Time		-	24	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	36	-	ns
t_f	Turn-Off Fall Time		-	26	-	ns
Q_g	Total Gate Charge	$V_{DS} = 100V, I_D = 9A,$ $V_{GS} = 10V$	-	13.9	-	nC
Q_{gs}	Gate-Source Charge		-	3.7	-	nC
Q_{gd}	Gate-Drain Charge		-	4.7	-	nC

■ Drain-Source Diode Characteristics

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_S	Drain-Source Diode Forward Continuous Current	$V_{GS} = 0V$	-	-	9	A
I_{SM}	Maximum Pulsed Current	$V_{GS} = 0V$	-	-	36	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0V, I_S = 4.5A$	-	-	1.2	V
T_{rr}	Body Diode Reverse Recovery Time	$I_S = 9A, V_{GS} = 0V$ $dI_F/dt = 100A/\mu s$	-	132	-	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$I_S = 9A, V_{GS} = 0V$ $dI_F/dt = 100A/\mu s$	-	613	-	nC

Notes:

- $T_J = +25^\circ C$ to $+150^\circ C$
- Repetitive rating; pulse width limited by maximum junction temperature.
- $I_{SD} = 9A, dI_F/dt \leq 100A/\mu s, V_{DD} \leq BV_{DS}$, Start $T_J = 25^\circ C$.
- $L = 10mH, V_{DD} = 100V, I_{AS} = 5.6A, R_G = 25\Omega$ Starting $T_J = 25^\circ C$.

■ Characteristic Curve

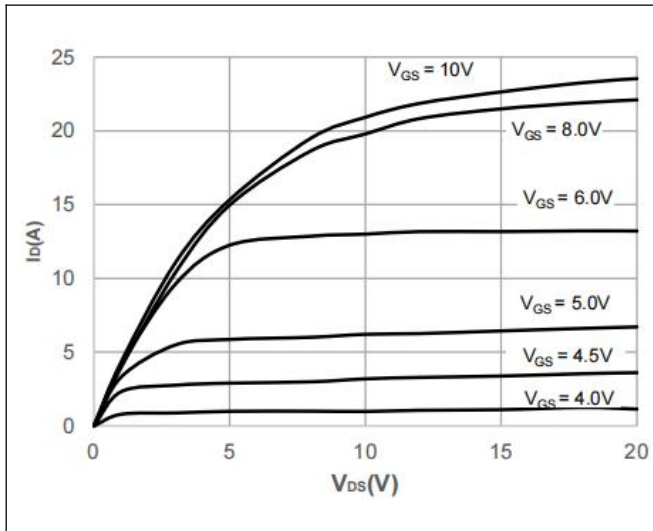


Figure 1. Typical Output Characteristics

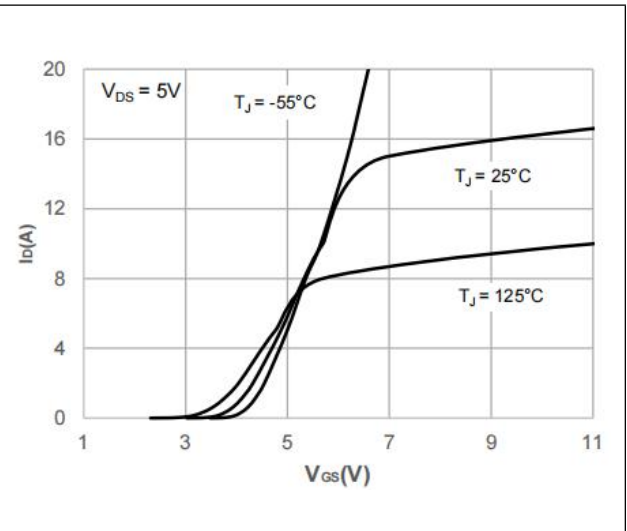


Figure 2. Typical Transfer Characteristics

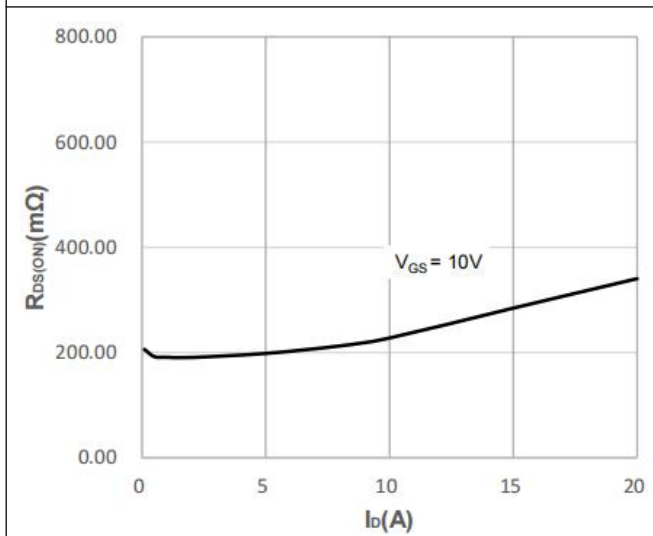


Figure 3. On-Resistance vs. Drain Current

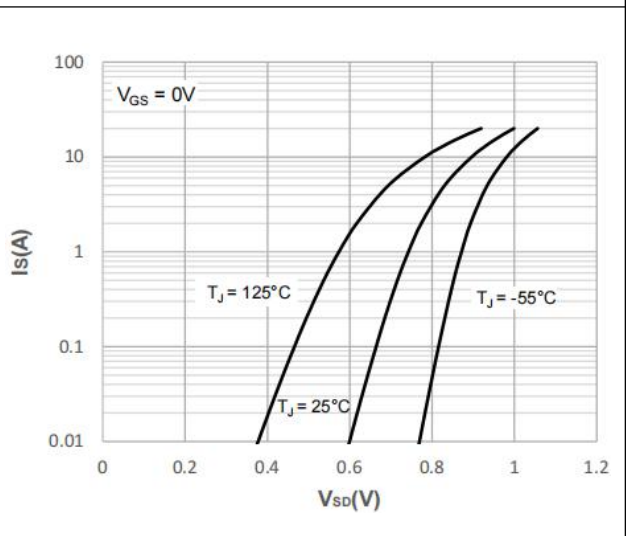


Figure 4. Body-Diode Characteristics

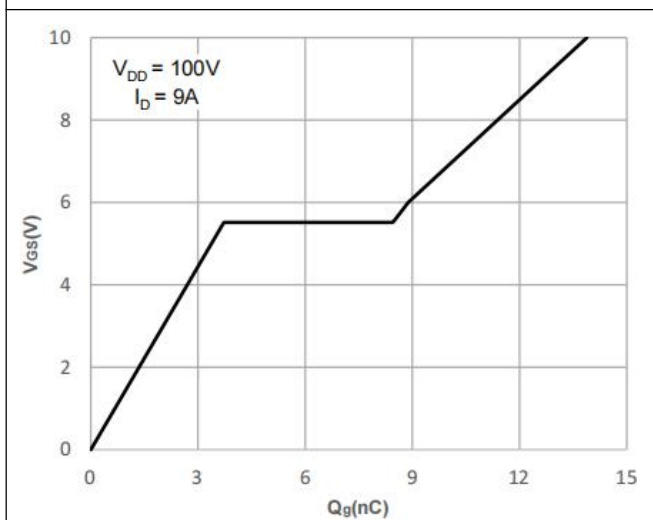


Figure 5. Gate-Charge Characteristics

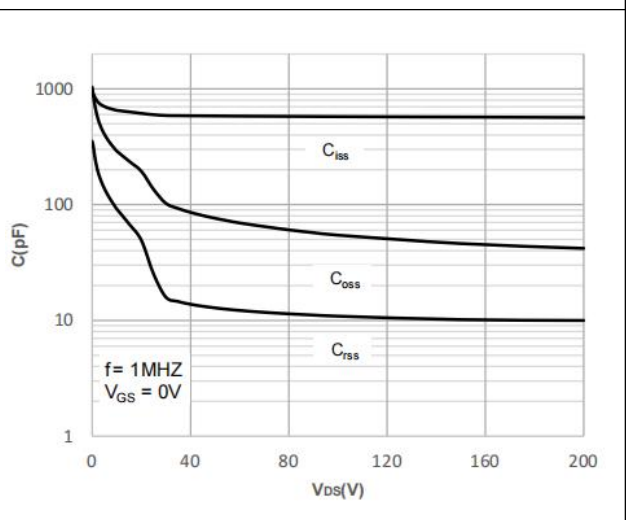


Figure 6. Capacitance Characteristics

■ Characteristic Curve

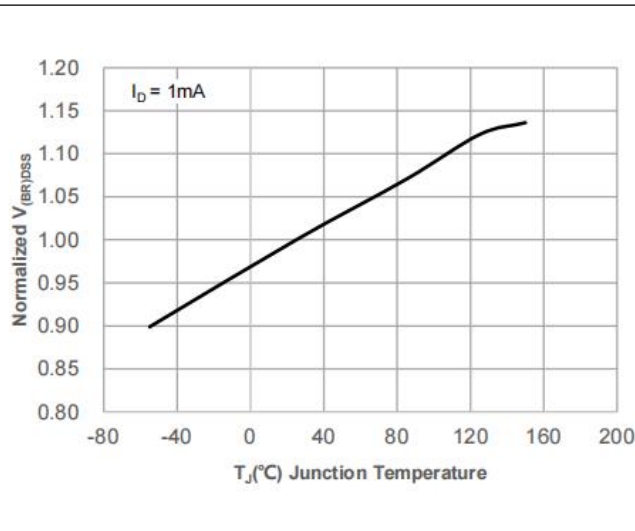


Figure 7. Normalized Breakdown voltage vs. Junction Temperature

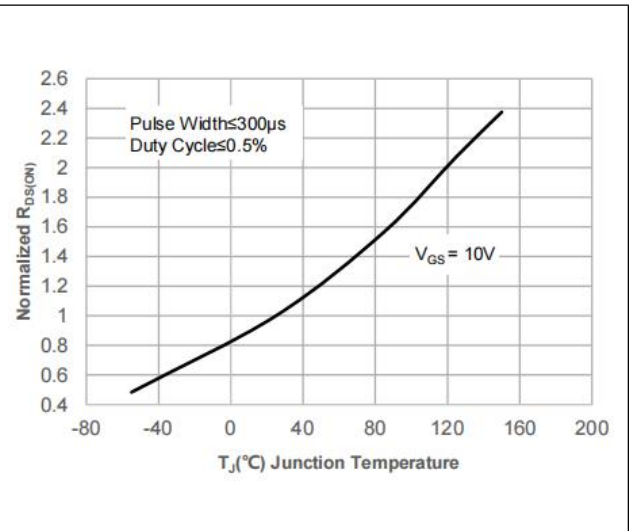


Figure 8. Normalized on Resistance vs. Junction Temperature

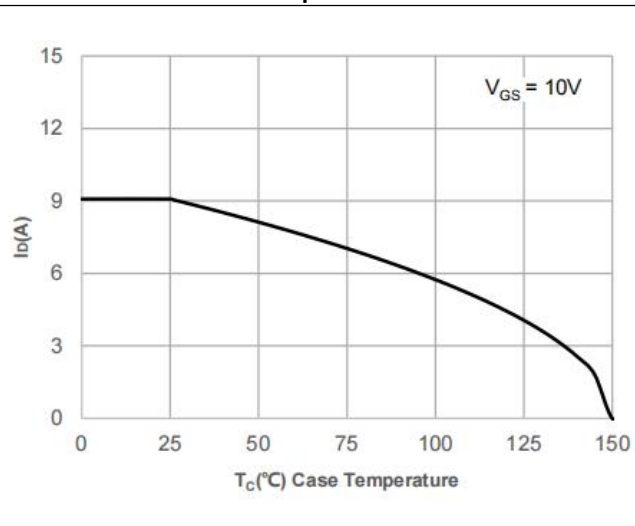


Figure 9: Maximum Continuous Drain Current vs. Case Temperature

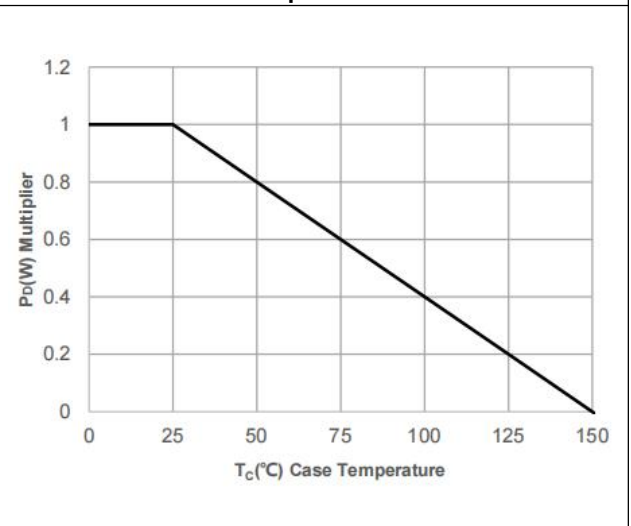


Figure 10: Maximum Power Dissipation vs Case Temperature

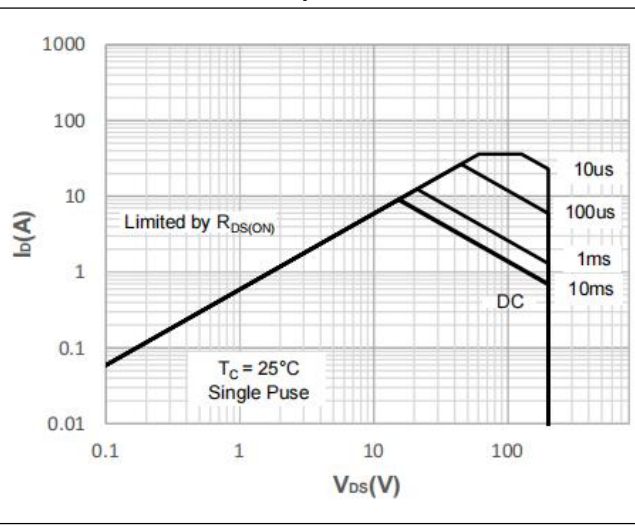


Figure 11. Maximum Safe Operating Area

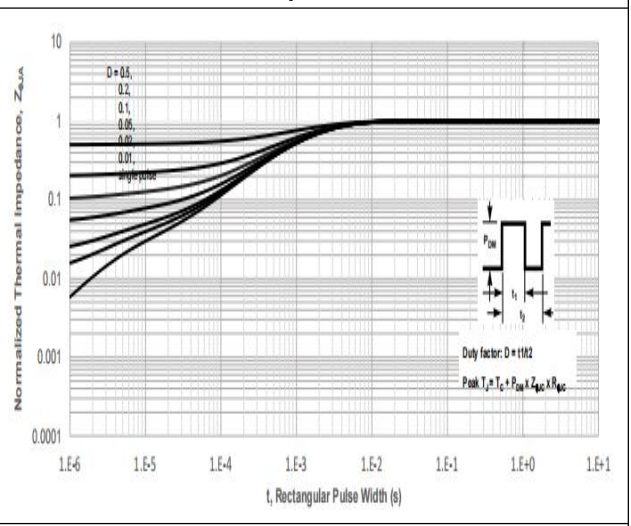
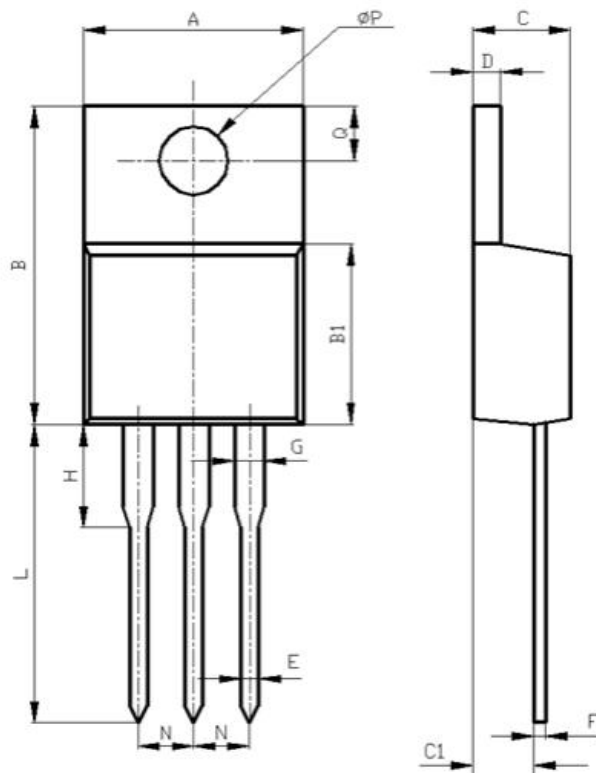


Figure 12: Normalized Maximum Transient Thermal Impedance

■ Package Information



Items	Values(mm)	
	MIN	MAX
A	9.60	10.6
B	15.0	16.0
B1	8.90	9.50
C	4.30	4.80
C1	2.30	3.10
D	1.20	1.40
E	0.70	0.90
F	0.30	0.60
G	1.17	1.37
H	2.70	3.80
L*	12.6	14.8
N	2.34	2.74
Q	2.40	3.00
Φ P	3.50	3.90