

## DESCRIPTION

The MXN50P04G uses advanced trench technology to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

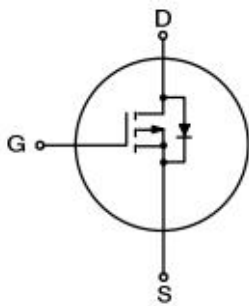
## GENERAL FEATURES

- $V_{DS}=-40V$ ,  $I_D=-50A$   
 $R_{DS(ON)}(Type)=12m\Omega$  @  $V_{GS}=-10V$   
 $R_{DS(ON)}(Type)=18m\Omega$  @  $V_{GS}=-4.5V$
- Low Thermal Resistance
- Advanced trench cell design

## APPLICATION

- Motor drivers
- DC-DC Converter

## PINOUT



Schematic diagram



PDFN5X6-8L Top View

Pin	Description
1,2,3	Source
4	Gate
5,6,7,8	Drain

## ORDERING INFORMATION

Part Number	Storage Temperature	Package	Devices Per Reel
MXN50P04G	-55°C to 150°C	PDFN5X6-8L	5000

## ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-40	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current ( $V_{GS}=-10V$ ) <sup>(Note1)</sup>	$I_D$	-50	A
Drain Current ( $V_{GS}=-10V$ , $T_C=100^\circ C$ ) <sup>(Note1)</sup>	$I_D$	-24	A
Pulsed Source Current ( $V_{GS}=-10V$ ) <sup>(Note1)(Note2)(Note3)</sup>	$I_{DM}$	-120	A
Diode Forward Current	$I_S$	-50	A
Total Power Dissipation <sup>(Note1)</sup>	$P_{tot}$	35	W
Single Pulsed Avalanche Energy <sup>(Note1)</sup>	$E_{AS}$	200	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C
Thermal Resistance, Junction-to-Case <sup>(Note1)</sup>	$R_{\theta JC}$	3.5	°C/W
Thermal Resistance, Junction-to-Ambient <sup>(Note1)</sup>	$R_{\theta JA}$	50	°C/W

Note 1. Surface Mounted on 1 in<sup>2</sup> pad area,  $t \leq 10$  sec

Note 2. Pulse width  $\leq 10\mu s$ , duty cycle  $\leq 1\%$

Note 3. limited by bonding wire



**ELECTRICAL CHARACTERISTICS** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

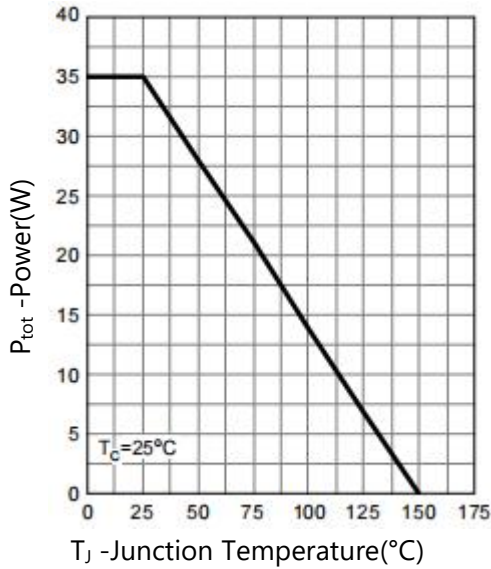
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-32V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.5	-	-2.5	V
Drain-Source On-State Resistance <sup>(Note1)</sup>	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-15A$	-	12	13	m $\Omega$
		$V_{GS}=-4.5V, I_D=-10A$	-	18	22	m $\Omega$
<b>Dynamic Characteristics<sup>(Note2)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS}=-20V, V_{GS}=0V, F=1.0MHz$	-	3375	-	pF
Output Capacitance	$C_{oss}$		-	233	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	184	-	pF
<b>Switching Characteristics<sup>(Note2)</sup></b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=-20V, I_{DS}=-15A, V_{GEN}=-10V, R_G=3.9\Omega, R_L=1.33\Omega$	-	9.6	-	nS
Turn-on Rise Time	$t_r$		-	40	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	72	-	nS
Turn-Off Fall Time	$t_f$		-	57	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-20V, I_{DS}=-15A, V_{GS}=-10V$	-	55	-	nC
Gate-Source Charge	$Q_{gs}$		-	15	-	nC
Gate-Drain Charge	$Q_{gd}$		-	7.4	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note1)</sup>	$V_{SD}$	$V_{GS}=0V, I_{SD}=-15A$	-	-	-1.3	V
Reverse Recovery Time	$t_{rr}$	$I_{SD}=-15A, di_{SD}/dt=100A/\mu s$	-	18	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	12	-	nC

Note 1. The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$

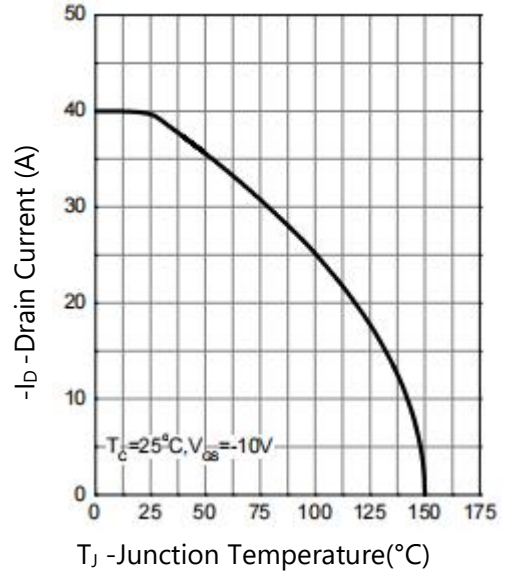
Note 2. Guaranteed by design, not subject to production testing

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

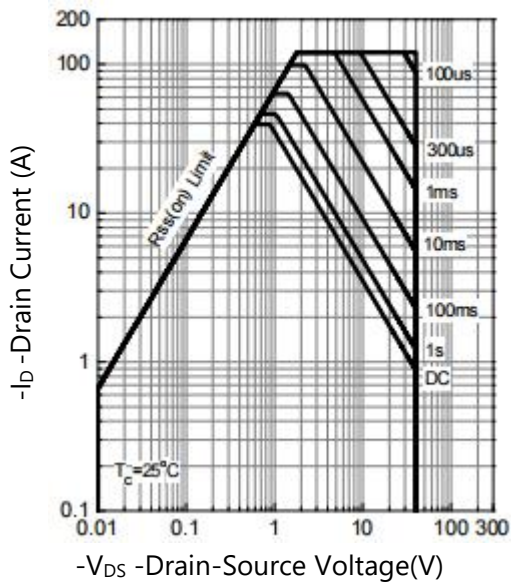
**Figure 1. Power Dissipation**



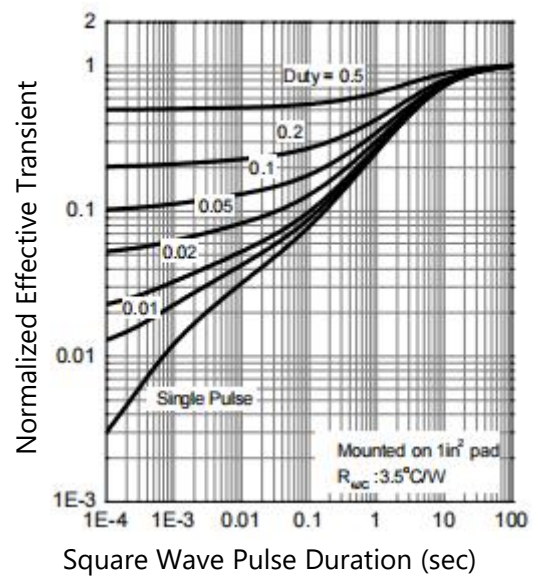
**Figure 2. Drain Current**



**Figure 3. Safe Operation Area**

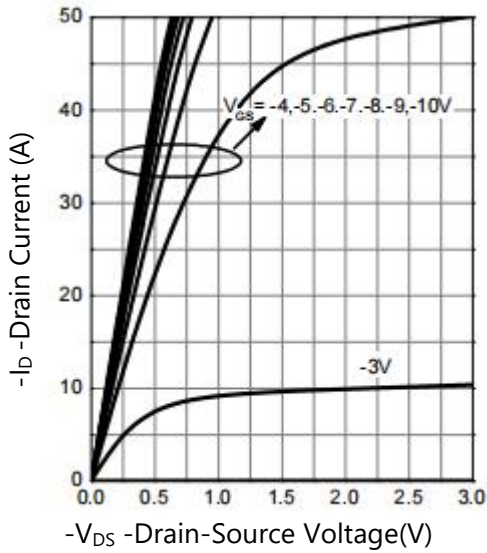


**Figure 4. Thermal Transient Impedance**

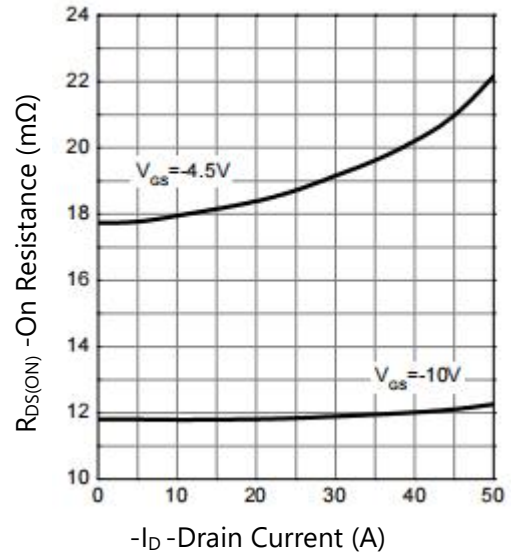


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

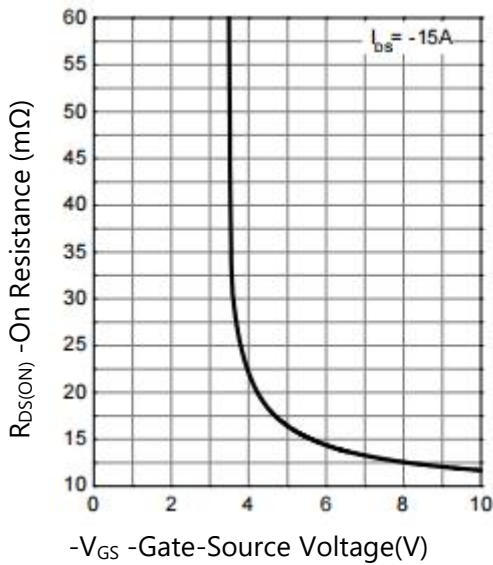
**Figure 5. Output Characteristics**



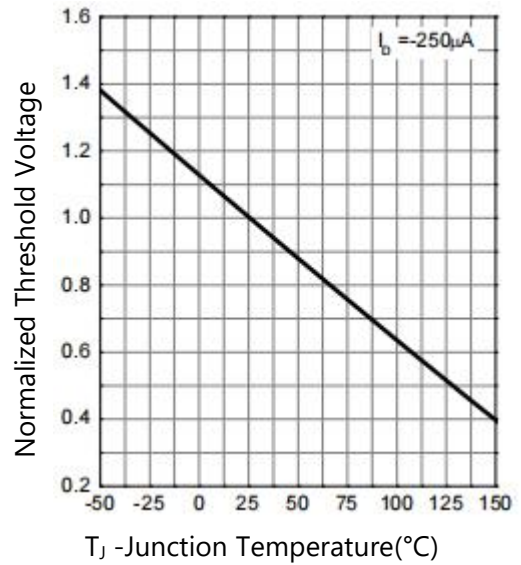
**Figure 6. Drain-Source On Resistance**



**Figure 7. Transfer Characteristics**



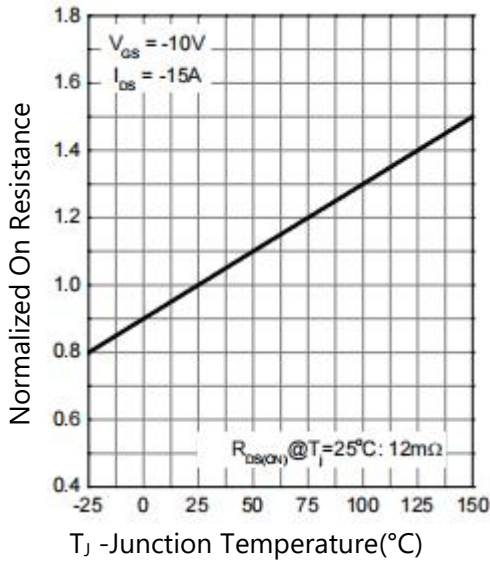
**Figure 8. Gate Threshold Voltage**



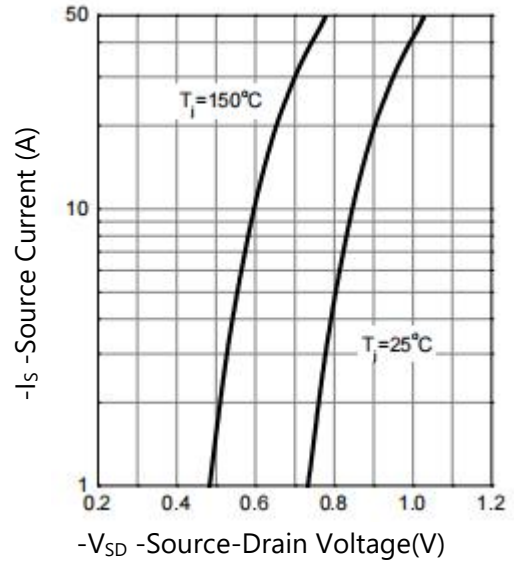


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

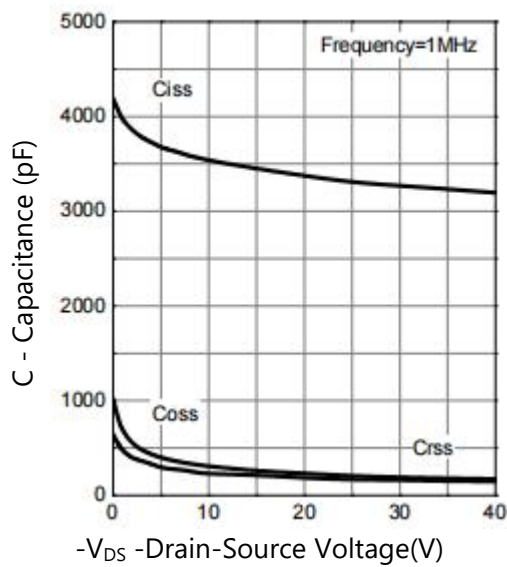
**Figure 9. Drain-Source On Resistance**



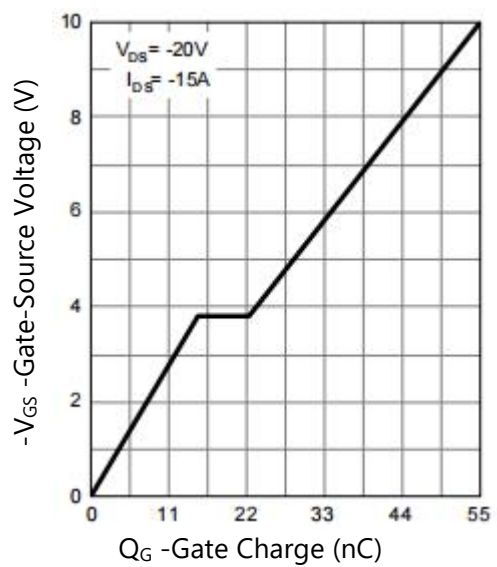
**Figure 10. Body Diode Characteristics**



**Figure 11. Capacitance**

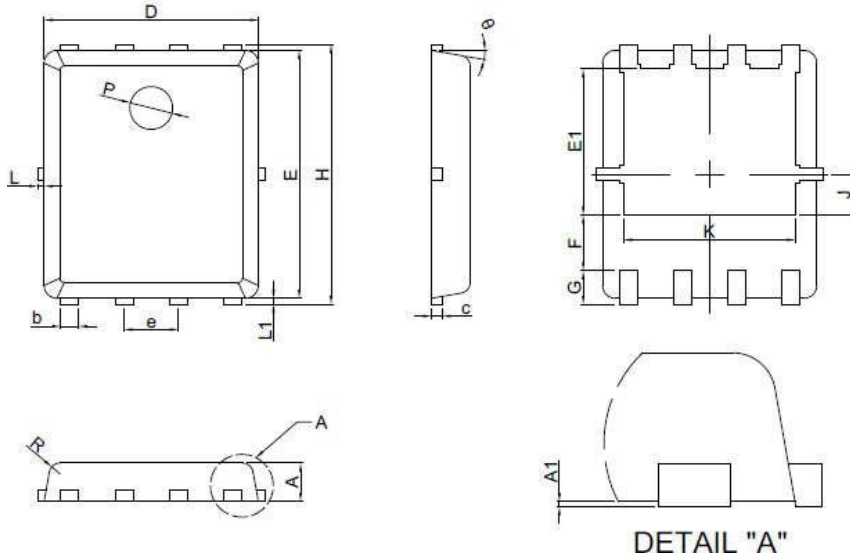


**Figure 12. Gate Charge**



 **PACKAGE INFORMATION**

PDFN5x6 - 8L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	0.80	1.00
A1	0.00	0.05
b	0.35	0.49
c	0.254REF	
D	4.90	5.10
F	1.40REF	
E	5.70	5.90
e	1.27BSC	
H	5.95	6.20
L1	0.10	0.18
G	0.60REF	
K	4.00REF	
L	-	0.15
J	0.95BSC	
P	1.00REF	
E1	3.40REF	
θ	6°	14°
R	0.25REF	