



## N-Channel Enhancement Mode Power MOSFET **MXN035N02**

### DESCRIPTION

The MXN035N02 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a wide variety of applications.

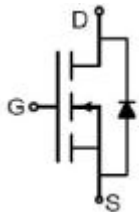
### GENERAL FEATURES

- $V_{DS}=20V$ ,  $I_D=56A$   
 $R_{DS(ON)}(Typ.)=4.7m\Omega$  @  $V_{GS}=2.5V$   
 $R_{DS(ON)}(Typ.)=3.5m\Omega$  @  $V_{GS}=4.5V$
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

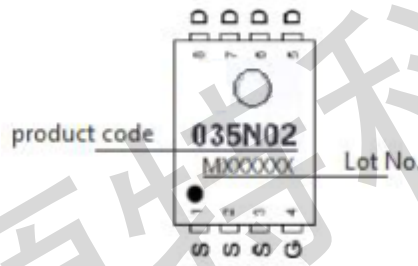
### APPLICATION

- Battery Protection
- Load switch
- Power management

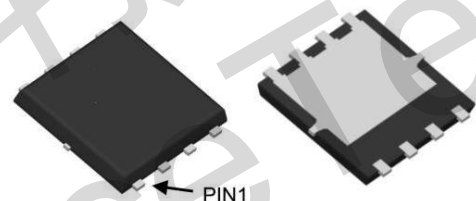
### PINOUT



Schematic diagram



Marking and Pin Assignment



DFN5X6-8L top & bottom view

### ORDERING INFORMATION

Device	Marking	Storage Temperature	Package	Devices Per Reel
MXN035N02	035N02	-55°C to 150°C	DFN5X6-8L	2500

### KEY PERFORMANCE PARAMETERS ( $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage ( $V_{GS}=0V$ )	$V_{DS}$	20	V
Gate-Source Voltage ( $V_{DS}=0V$ )	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous ( $T_C=25^\circ C$ ) <sup>(Note1)</sup>	$I_D$	56	A
Drain Current-Continuous ( $T_C=100^\circ C$ )	$I_D$	35.5	A
Drain Current-Continuous@Current-Pulsed <sup>(Note2)</sup>	$I_{DM(pluse)}$	224	A
Maximum Power Dissipation ( $T_C=25^\circ C$ )	$P_D$	43.1	W
Maximum Power Dissipation ( $T_C=100^\circ C$ )	$P_D$	17.2	W
Single Pulse Avalanche Energy <sup>(Note3)</sup>	$E_{AS}$	340	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

### THERMAL CHARACTERISTIC

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.9	$^\circ C/W$

Notes 1.The maximum current rating is package limited.

Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3. $E_{AS}$  condition:  $T_J=25^\circ C, V_{DD}=30V, V_G=4.5V, R_G=25\Omega$ ,



N-Channel Enhancement Mode Power MOSFET **MXN035N02**



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

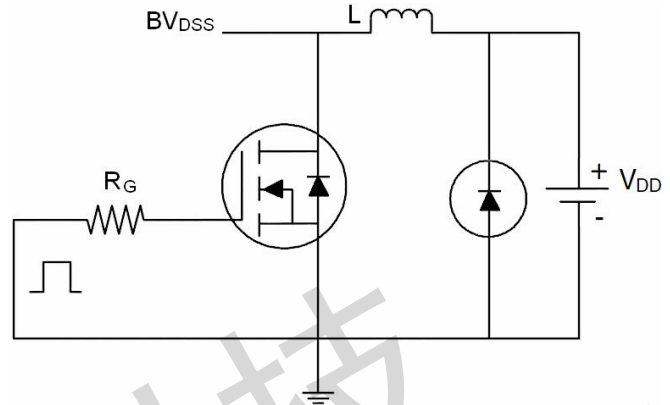
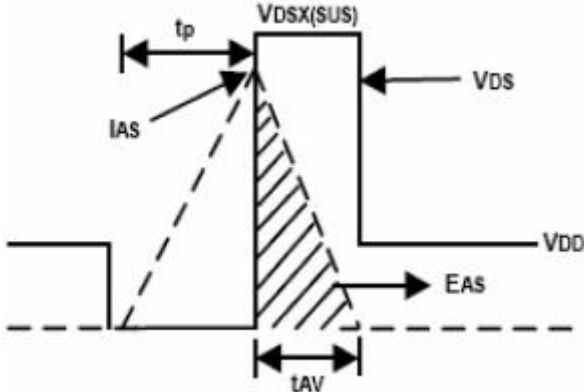
Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>On/Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	20	23	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=20V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.7	1.1	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=2.5V, I_D=15A$	-	4.7	8.9	m $\Omega$
		$V_{GS}=4.5V, I_D=20A, T_C=125^\circ\text{C}$	-	5.1	8.9	m $\Omega$
		$V_{GS}=4.5V, I_D=20A, T_C=25^\circ\text{C}$	-	3.5	4.9	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=15A$	-	40	-	S
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	2800	-	pF
Output Capacitance	$C_{oss}$		-	353	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	265	-	pF
Gate resistance	$R_g$	$V_{DS}=0V, V_{GS}=0V, F=1.0\text{MHz}$	-	1.1	-	$\Omega$
Total Gate Charge	$Q_g$	$V_{DS}=10V, I_D=12A,$ $V_{GS}=4.5V$	-	32	-	nC
Gate-Source Charge	$Q_{gs}$		-	3	-	nC
Gate-Drain Charge	$Q_{gd}$		-	11	-	nC
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=15V, R_L=0.75\Omega$ $V_{GS}=4.5V, R_{GEN}=3\Omega$	-	17	-	nS
Turn-on Rise Time	$t_r$		-	49	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	74	-	nS
Turn-Off Fall Time	$t_f$		-	26	-	nS
<b>Source-Drain Diode Characteristics</b>						
Source-Drain Current(Body Diode)	$I_{SD}$		-	-	54	A
Forward On Voltage	$V_{SD}$	$V_{GS}=0V, I_{SD}=20A$	-	-	1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F=20A,$ $di/dt=100A/\mu s$	-	23	-	nS
Reverse Recovery Charge	$Q_{rr}$		-	10	-	nC



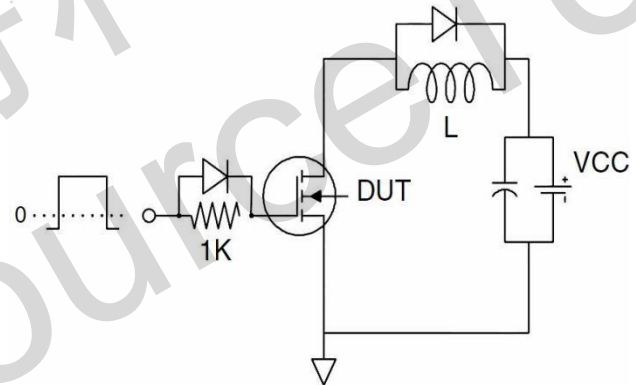
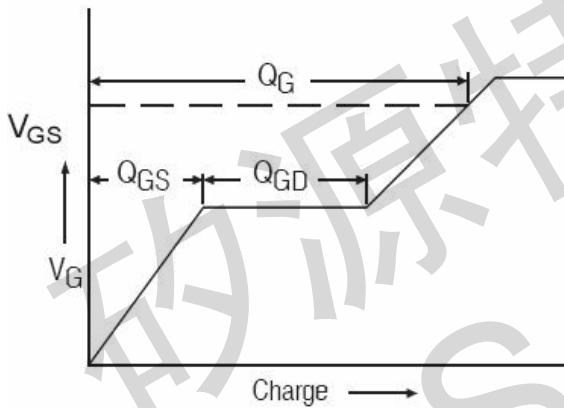
N-Channel Enhancement Mode Power MOSFET **MXN035N02**

**TEST CIRCUIT**

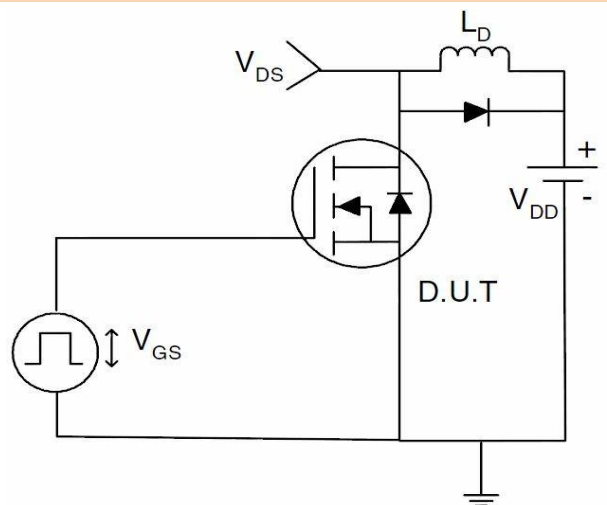
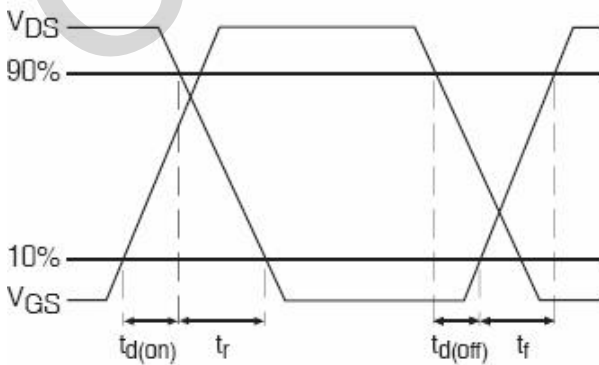
1) EAS Test Circuits



2) Gate Charge Test Circuit



3) Switch Time Test Circuit

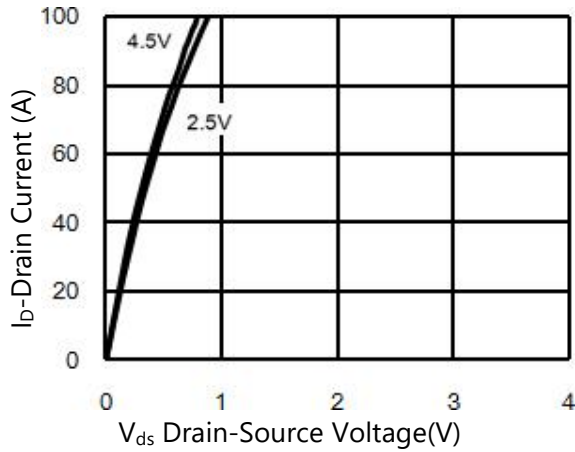




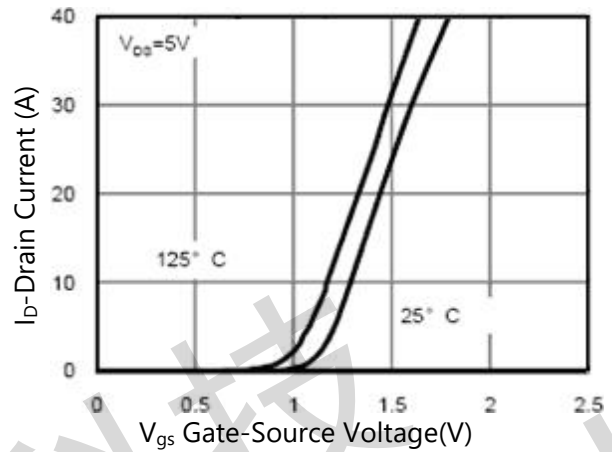
N-Channel Enhancement Mode Power MOSFET **MXN035N02**

**TYPICAL PERFORMANCE CHARACTERISTICS**

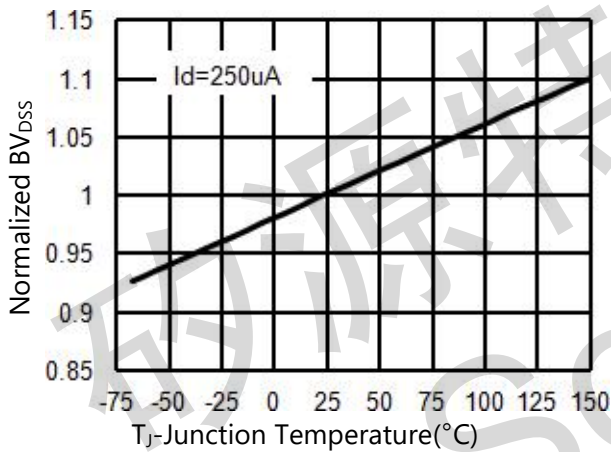
**Figure1. Output Characteristics**



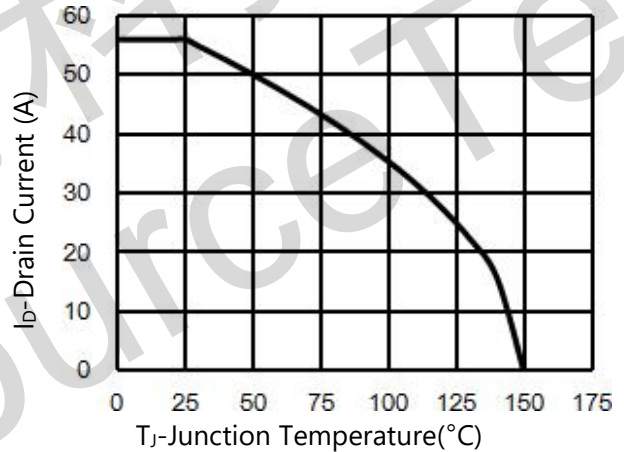
**Figure2. Transfer Characteristics**



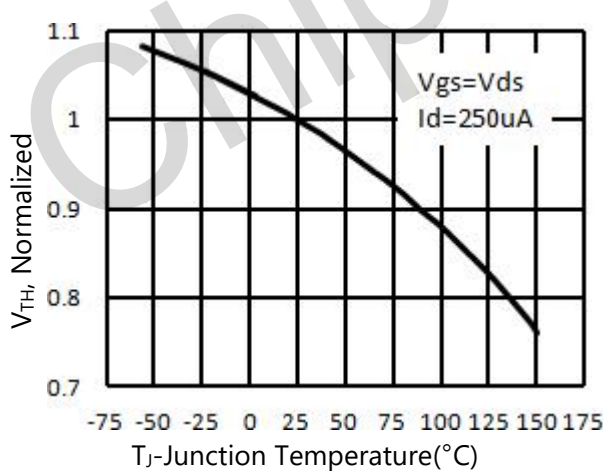
**Figure3. BV<sub>DSS</sub> vs Junction Temperature**



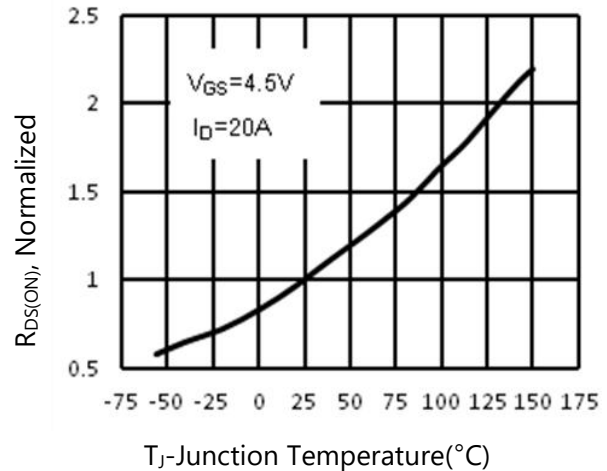
**Figure4. Drain Current**



**Figure5. V<sub>GS(th)</sub> vs Junction Temperature**



**Figure6. R<sub>DS(ON)</sub> vs Junction Temperature**

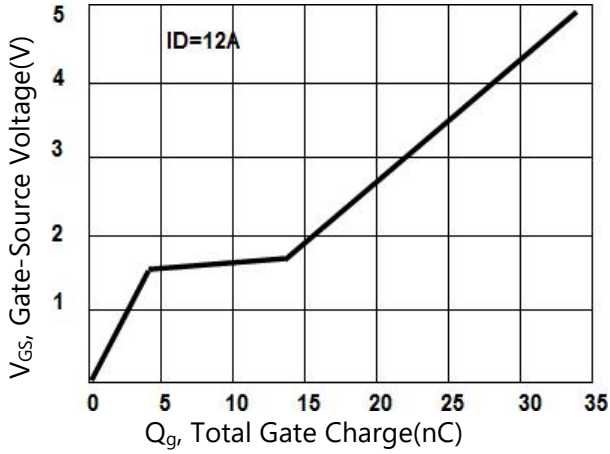




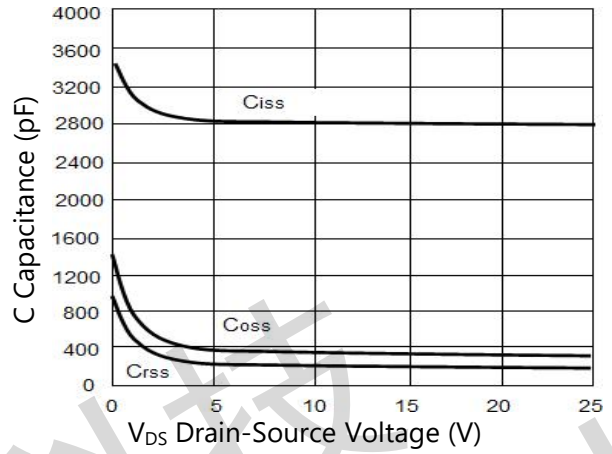
N-Channel Enhancement Mode Power MOSFET **MXN035N02**

**TYPICAL PERFORMANCE CHARACTERISTICS**

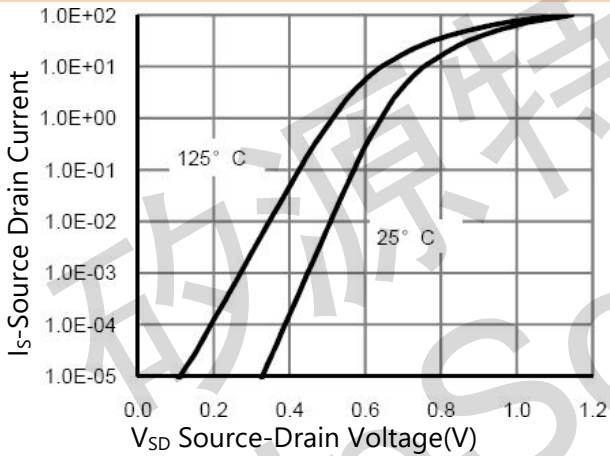
**Figure7. Gate Charge Waveforms**



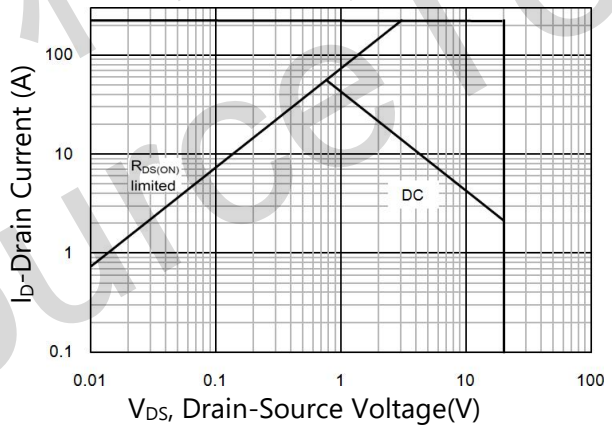
**Figure8. Capacitance**



**Figure9. Body Diode Forward**



**Figure10. Maximum Safe Operating Area**

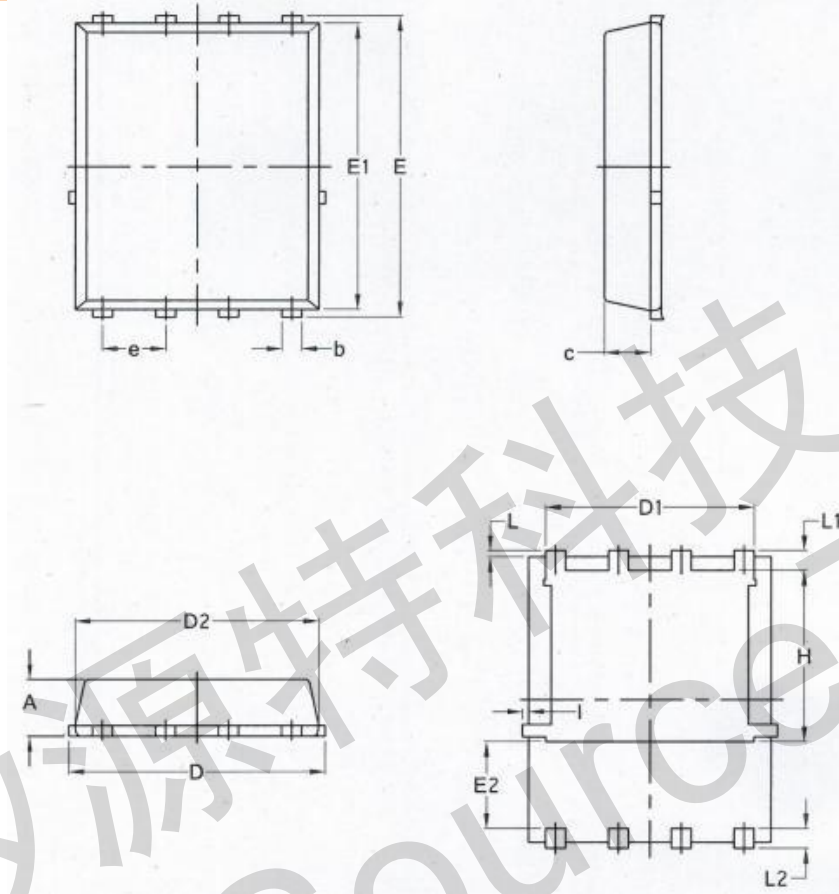




N-Channel Enhancement Mode Power MOSFET **MXN035N02**

 **PACKAGE INFORMATION**

DFN5X6-8L



SYMBOL	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	1.03	1.17	0.0406	0.0461
b	0.34	0.48	0.0134	0.0189
c	0.824	0.970	0.0324	0.0382
D	4.80	5.40	0.1890	0.2126
D1	4.11	4.31	0.1618	0.1697
D2	4.80	5.00	0.1890	0.1969
E	5.95	6.15	0.2343	0.2421
E1	5.65	5.85	0.2224	0.2303
E2	1.60	-	0.0630	-
e	1.27 BSC		0.05 BSC	
L	0.05	0.25	0.0020	0.0098
L1	0.38	0.50	0.0150	0.0197
L2	0.38	0.50	0.0150	0.0197
H	3.30	3.50	0.1299	0.1378
l	-	0.18	-	0.0070