



## P-Channel Enhancement Mode Power MOSFET **MXD10P03K**

### DESCRIPTION

The MXD10P03K uses advanced trench technology to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

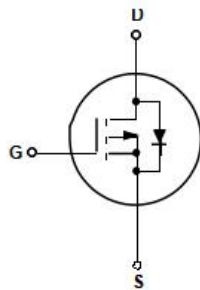
### GENERAL FEATURES

- $V_{DS}=-30V$ ,  $I_D=-60A$   
 $R_{DS(ON)}(Typ.)=11m\Omega$  @  $V_{GS}=-4.5V$   
 $R_{DS(ON)}(Typ.)=7.5m\Omega$  @  $V_{GS}=-10V$
- Low Thermal Resistance
- Advanced trench cell design

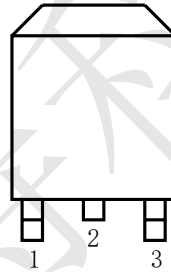
### APPLICATION

- Motor drivers
- DC-DC Converter

### PINOUT



Schematic diagram



TO-252 top view

Pin	Description
1	Gate(G)
2	Source(S)
3	Drain(D)

### ORDERING INFORMATION

Part Number	Storage Temperature	Package	Devices Per Reel
MXD10P03K	-55°C to 150°C	TO252	2500

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current ( $V_{GS}=-10V$ ) <sup>(Note1)</sup>	$I_D$	-60	A
Pulsed Source Current ( $V_{GS}=-10V$ ) <sup>(Note1)(Note2)(Note3)</sup>	$I_{DM}$	-144	A
Diode Forward Current	$I_S$	-60	A
Total Power Dissipation <sup>(Note1)</sup>	$P_{tot}$	20	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	°C
Thermal Resistance, Junction-to-Case <sup>(Note1)</sup>	$R_{\theta JC}$	6	°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



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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
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**Off Characteristics**

Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-24V, V_{GS}=0V$	-	-	-1	$\mu A$
		$V_{DS}=-24V, V_{GS}=0V, T_J=85^\circ C$	-	-	-30	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA

**On Characteristics**

Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.5	-2.4	V
Drain-Source On-State Resistance <sup>(Note1)</sup>	$R_{DS(ON)}$	$V_{GS}=-4.5V, I_D=-10A$	-	11	14	m $\Omega$
		$V_{GS}=-10V, I_D=-20A$	-	7.5	9	m $\Omega$

**Dynamic Characteristics**<sup>(Note2)</sup>

Input Capacitance	$C_{iss}$	$V_{DS}=-15V, V_{GS}=0V, F=1.0MHz$	-	2000	-	pF
Output Capacitance	$C_{oss}$		-	290	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	270	-	pF

**Switching Characteristics**<sup>(Note2)</sup>

Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=-15V, I_D=-20A, V_{GEN}=-10V, R_G=4.5\Omega, R_L=0.75\Omega,$	-	10	-	nS
Turn-on Rise Time	$t_r$		-	8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	43	-	nS
Turn-Off Fall Time	$t_f$		-	18	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-15V, I_{DS}=-20A, V_{GS}=-10V$	-	36	-	nC
Gate-Source Charge	$Q_{gs}$		-	5.3	-	nC
Gate-Drain Charge	$Q_{gd}$		-	8.8	-	nC

**Drain-Source Diode Characteristics**

Diode Forward Voltage <sup>(Note1)</sup>	$V_{SD}$	$V_{GS}=0V, I_{SD}=-20A$	-	-	-1.3	V
Reverse Recovery Time	$t_{rr}$	$I_{SD}=-20A,$	-	21	-	nS
Reverse Recovery Charge	$Q_{rr}$	$di_{SD}/dt=100A/\mu s$	-	14	-	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



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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Power Capability

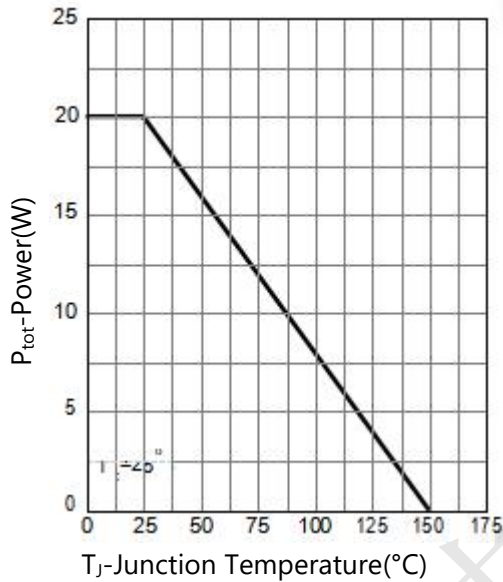


Figure 2. Current Capability

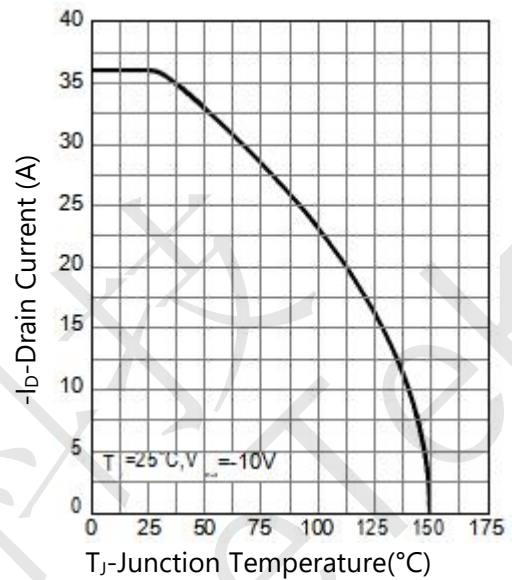


Figure 3. Safe Operation Area

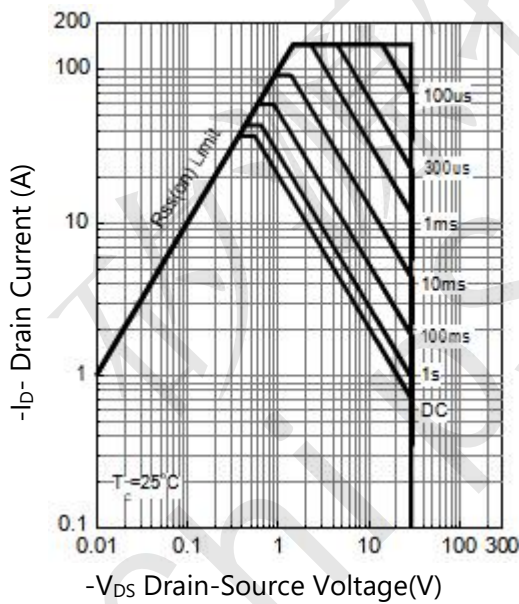
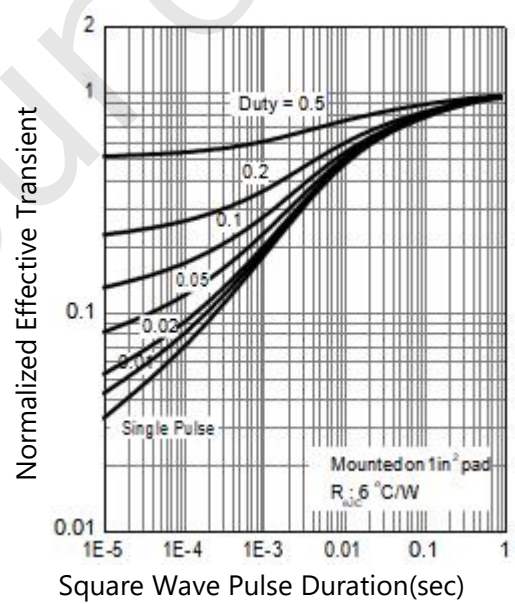


Figure 4. Transient Thermal Impedance





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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 5. Output Characteristics

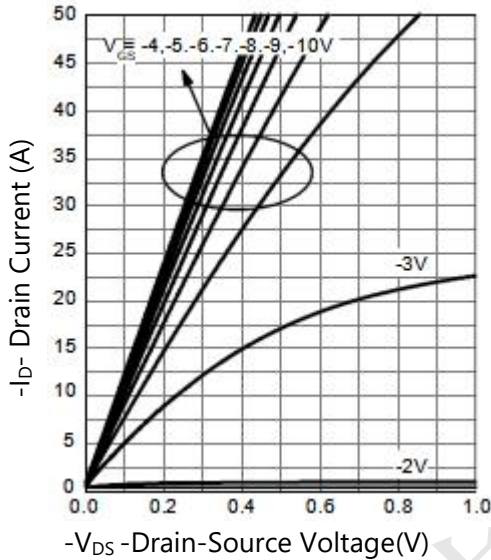


Figure 6. Drain-Source On Resistance

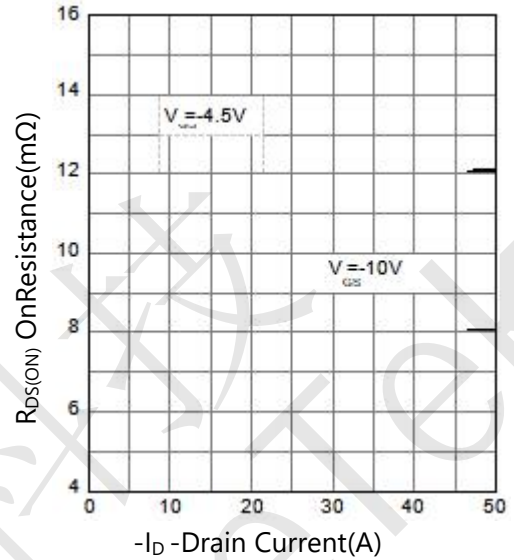


Figure 7. Transfer Characteristics

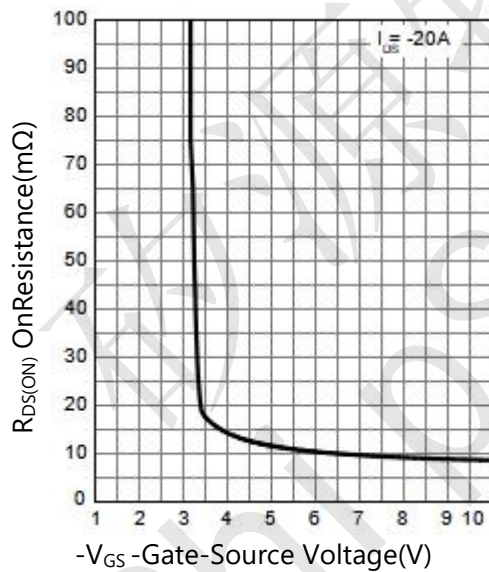
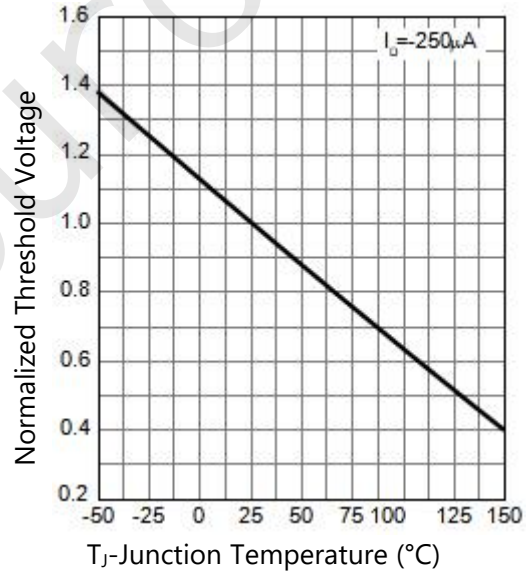


Figure 8. Normalized Threshold Voltage





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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 9. Normalized On Resistance

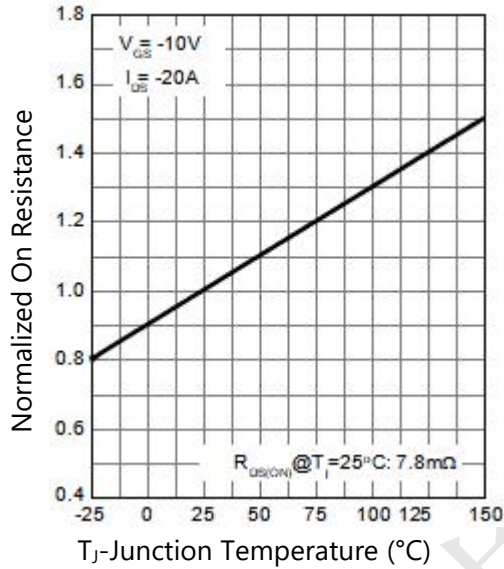


Figure 10. Diode Forward Current

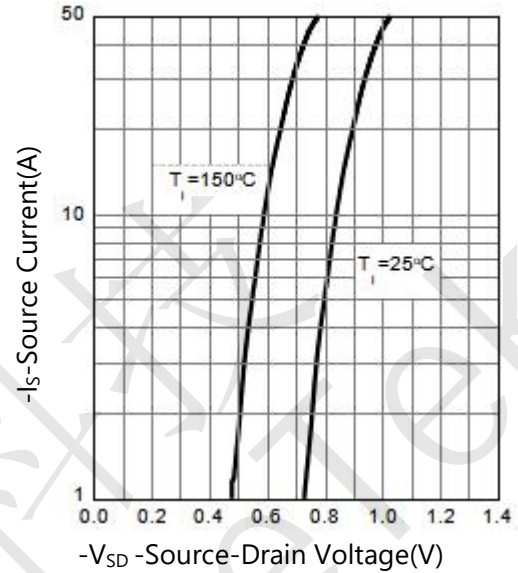


Figure 11. Capacitance

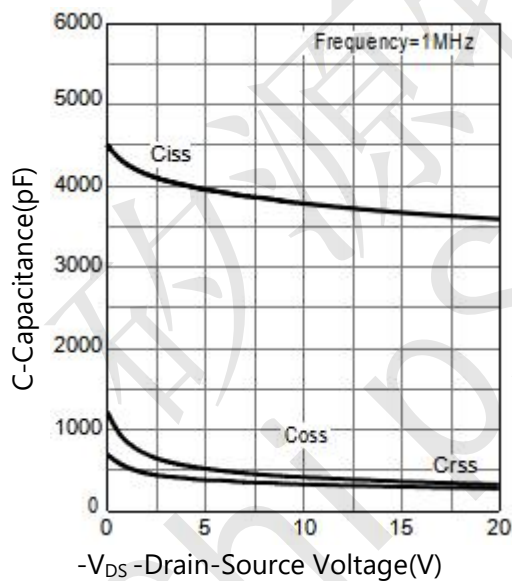
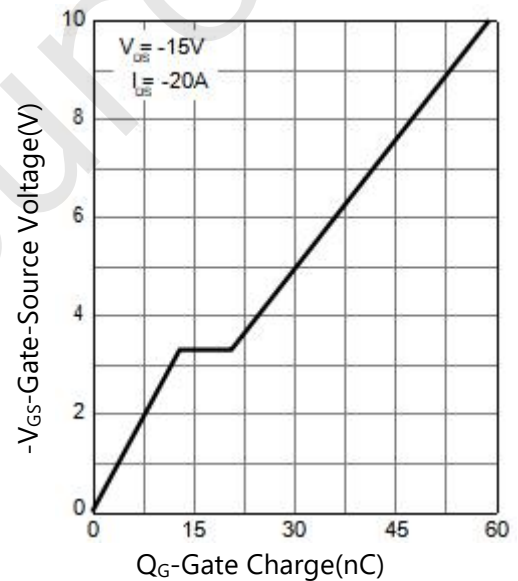


Figure 12. Gate Charge



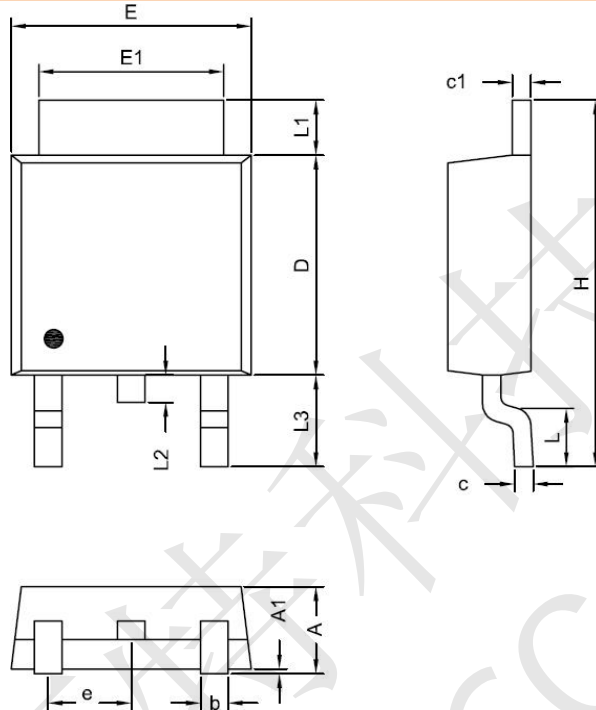


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PACKAGE INFORMATION

TO252



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	2.19	2.38
A1	0.02	0.13
D	5.30	6.40
E	6.35	6.80
E1	5.20	5.50
c	0.40	0.60
C1	0.40	0.60
b	0.55	0.85
e	2.30 BCS	
L	1.00	1.80
L1	0.70	1.80
L2	0.70 BCS	
L3	2.40	2.80
H	9.20	10.40