



P-Channel Enhancement Mode Power MOSFET **MXD60P110**



DESCRIPTION

The MXD60P110 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as -4.5V. This device is suitable for use as a wide variety of applications.



GENERAL FEATURES

- $V_{DS} = -60V$, $I_D = -60A$
 $R_{DS(ON)}(Typ.) = 12m\Omega$ @ $V_{GS} = -10V$
 $R_{DS(ON)}(Typ.) = 14.3m\Omega$ @ $V_{GS} = -4.5V$
- High power and current handling capability
- Lead free product is acquired

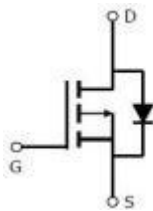


APPLICATION

- Load switch



PINOUT



Schematic diagram



TO-252 top view



ORDERING INFORMATION

Part Number	Storage Temperature	Package	Devices Per Reel
MXD60P110	-55°C to 175°C	TO-252	2500



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous ($T_C = 25^\circ C$)	I_D	-60	A
Drain Current-Continuous ($T_C = 100^\circ C$)	I_D	-42	A
Drain Current-Continuous@ Current-Pulsed (Note1)	$I_{DM(pluse)}$	-240	A
Avalanche Energy (Note2)	E_{AS}	484	mJ
Maximum Power Dissipation ($T_C = 25^\circ C$)	P_D	107	W
Maximum Power Dissipation ($T_C = 100^\circ C$)	P_D	53	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ C$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.4	$^\circ C/W$

Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature

Note 2. E_{AS} condition: $T_J = 25^\circ C$, $V_{DD} = 40V$, $V_G = -10V$, $R_G = 25\Omega$, $L = 0.5mH$.



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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-60	-72	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-60V, V_{GS}=0V$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.8	-2.5	V
Drain-Source On-State Resistance ^(Note1)	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-20A$	-	12	14.4	m Ω
		$V_{GS}=-4.5V, I_D=-15A$	-	14.3	18.6	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-20A$	-	38	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=-25V, V_{GS}=0V, F=1.0MHz$	-	8700	-	pF
Output Capacitance	C_{oss}		-	290	-	pF
Reverse Transfer Capacitance	C_{rss}		-	210	-	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=-30V, V_{GS}=-10V, R_G=3\Omega, R_L=1.5\Omega,$	-	26	-	nS
Turn-on Rise Time	t_r		-	21	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	138	-	nS
Turn-Off Fall Time	t_f		-	30	-	nS
Total Gate Charge	Q_g	$V_{DS}=-30V, I_D=-20A, V_{GS}=-10V$	-	140	-	nC
Gate-Source Charge	Q_{gs}		-	19	-	nC
Gate-Drain Charge	Q_{gd}		-	28	-	nC
Drain-Source Diode Characteristics						
Source-Drain Current(Body Diode)	I_{SD}		-	-	-60	A
Forward on Voltage ^(Note1)	V_{SD}	$V_{GS}=0V, I_S=-20A$	-	-	-1.2	V
Reverse Recovery Time	t_{rr}	$I_F=-20A, dl/dt=100A/\mu s$	-	56	-	nS
Reverse Recovery Charge	Q_{rr}		-	63	-	nC

Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Power Dissipation

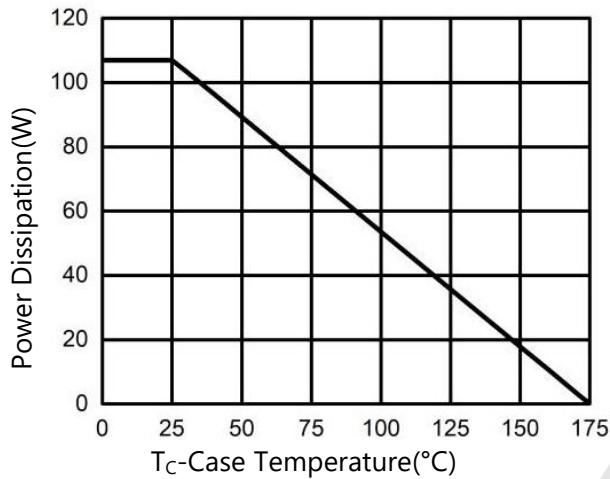


Figure 2. Drain Current

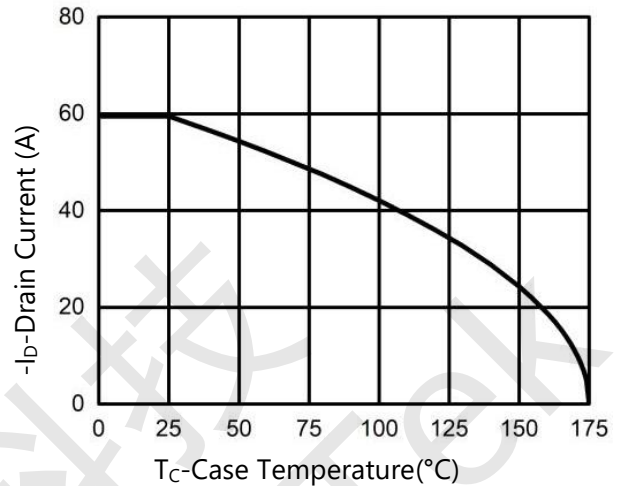


Figure 3. Output Characteristics

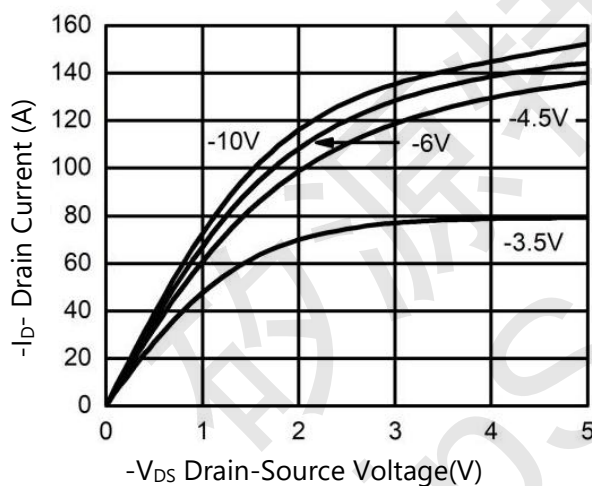


Figure 4. Transfer Characteristics

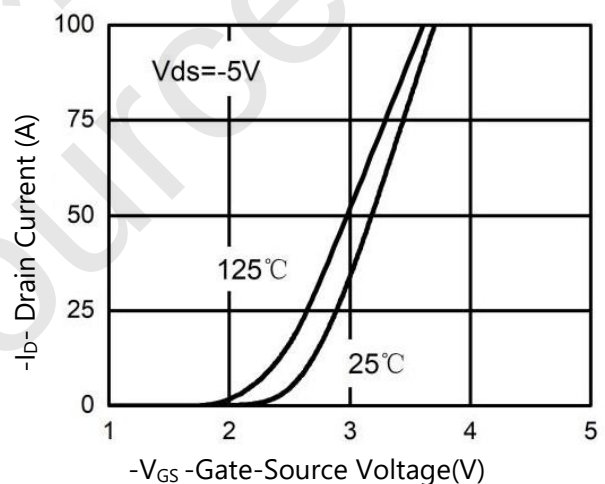


Figure 5. BV_{DSS} vs Junction Temperature

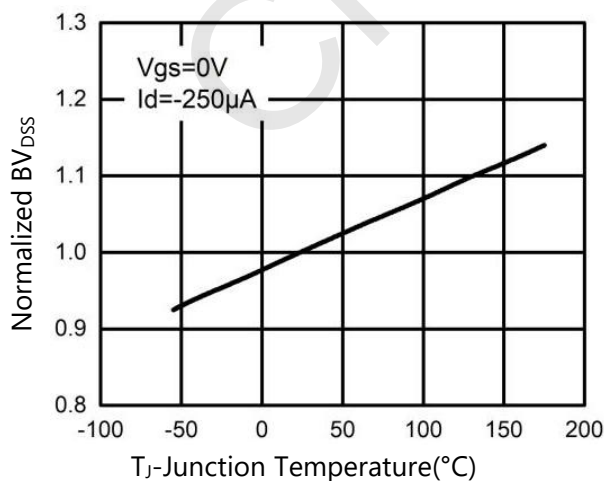
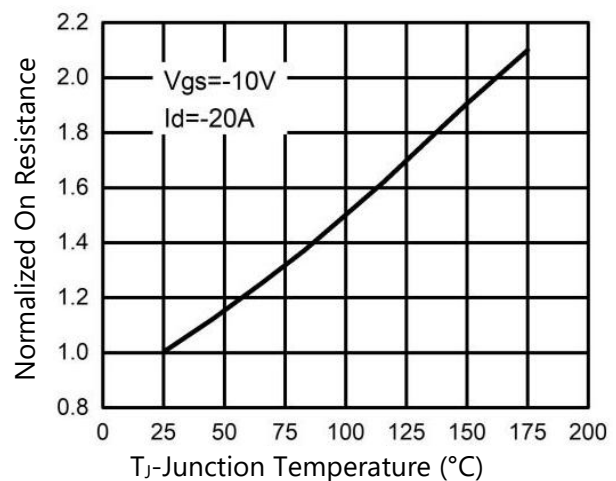


Figure 6. $R_{DS(ON)}$ vs Junction Temperature





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7. Capacitance

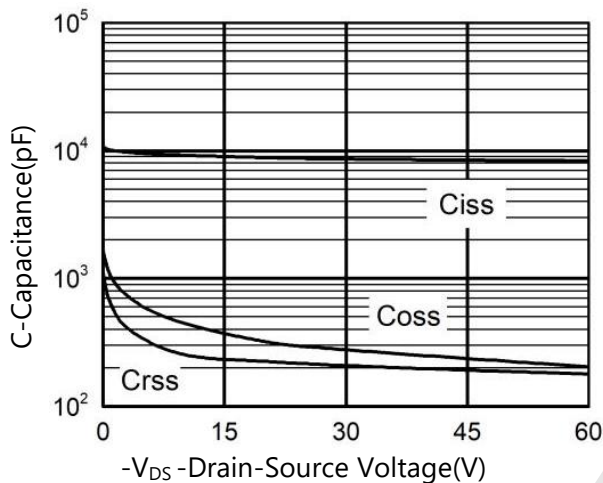


Figure 6. Gate Charge Waveforms

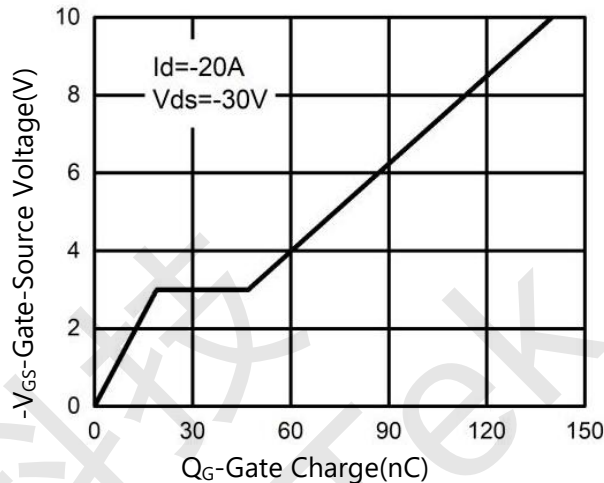


Figure 9. Body-Diode Characteristics

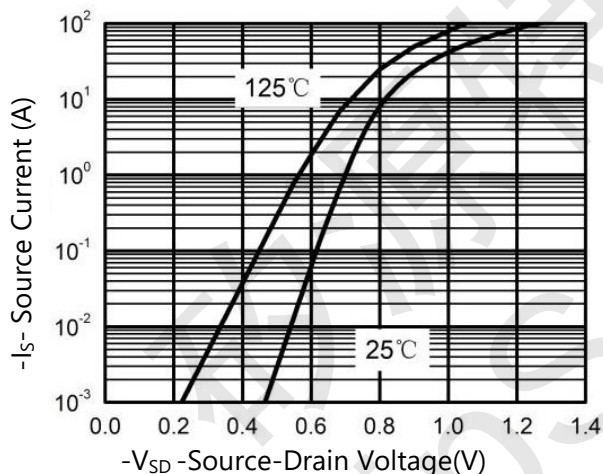
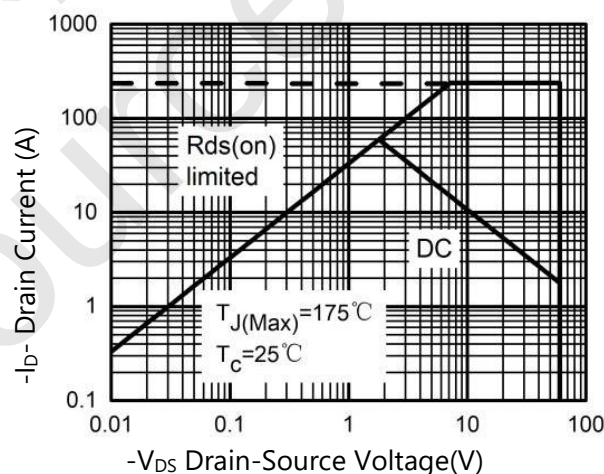


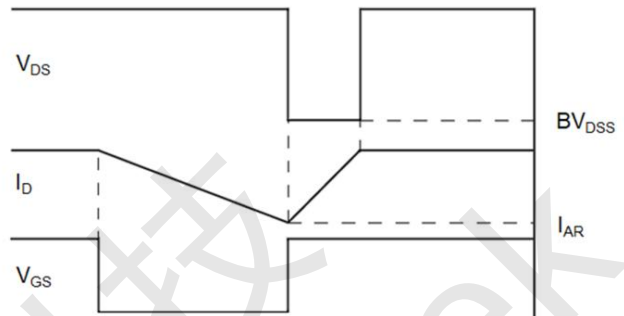
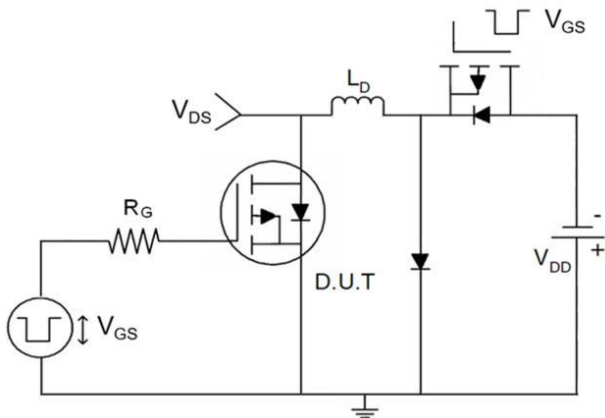
Figure 10. Maximum Safe Operating Area



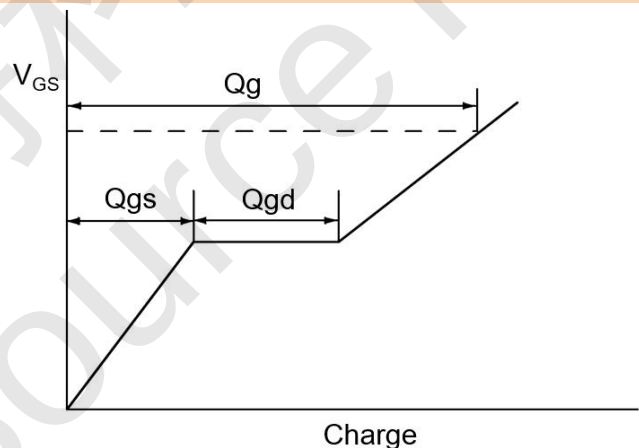
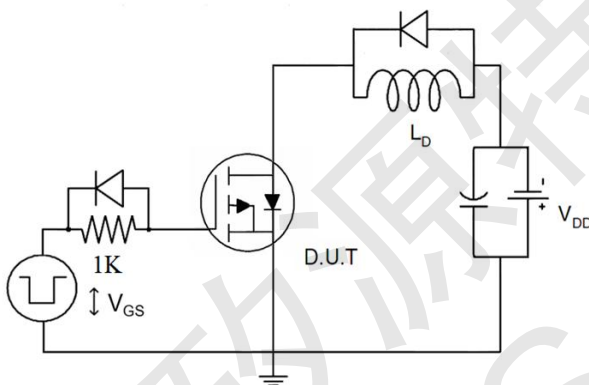


TEST CIRCUIT AND SWITCHING WAVEFORMS

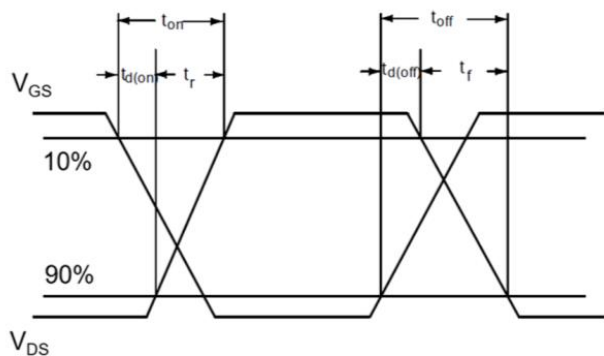
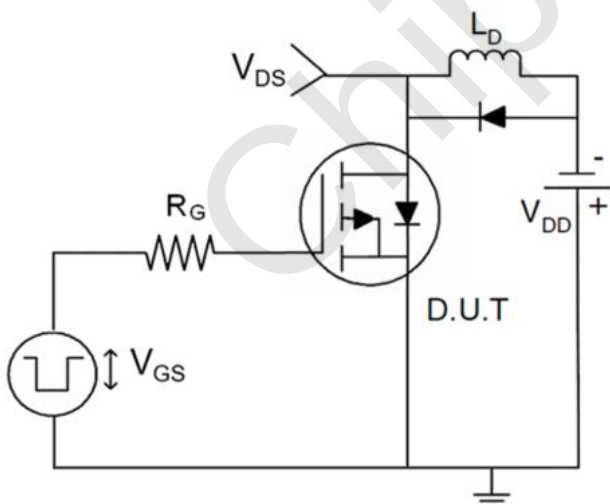
1) E_{AS} Test Circuits



2) Gate Charge Test Circuit



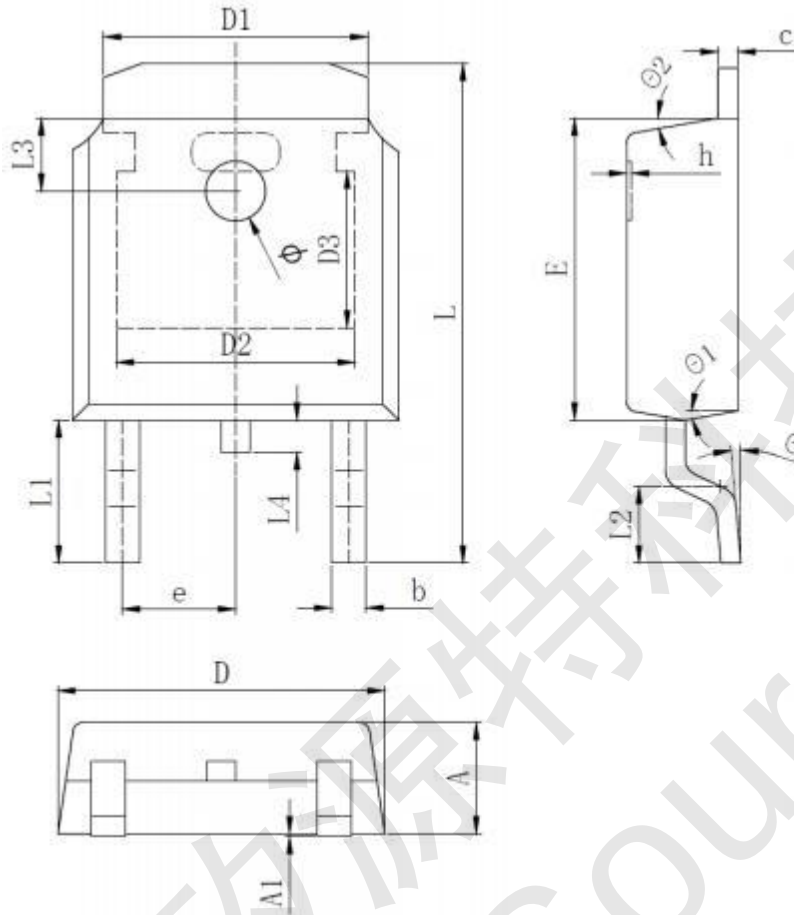
3) Switch Time Test Circuit





PACKAGE INFORMATION

TO252



SYMBOL	MILLIMETER		
	MIN	Typ.	MAX
A	2.200	2.300	2.400
A1	0.000		0.127
b	0.640	0.690	0.740
c (电镀后)	0.460	0.520	0.580
D	6.500	6.600	6.700
D1	5.334 REF		
D2	4.826 REF		
D3	3.166 REF		
E	6.000	6.100	6.200
e	2.286 TYP		
h	0.000	0.100	0.200
L	9.900	10.100	10.300
L1	2.888 REF		
L2	1.400	1.550	1.700
L3	1.600 REF		
L4	0.600	0.800	1.000
ϕ	1.100	1.200	1.300
θ	0°		8°
θ_1	9° TYP		
θ_2	9° TYP		