N-Channel Enhancement Mode Power MOSFET **MXD2060K**

DESCRIPTION

The MXD2060K 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.

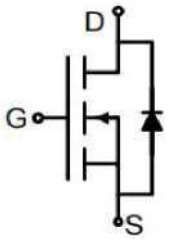
GENERAL FEATURES

- V_{DS}=20V, I_D=60A
  $R_{DS(ON)}$(Typ.)=6.2mΩ @ V_{GS}=2.5V
  $R_{DS(ON)}$(Typ.)=4.8mΩ @ V_{GS}=4.5V
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

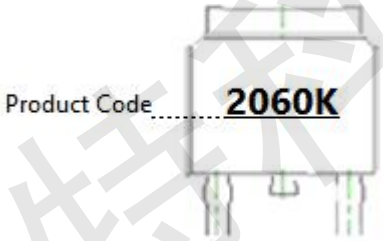
APPLICATION

- Battery Protection
- Load switch
- Power management

PINOUT



Schematic diagram



Marking and pin Assignment


TO-252 top view

ORDERING INFORMATION

Device	Marking	StorageTemperature	Package	Devices Per Reel
MXD2060K	2060K	-55°C to 150°C	TO-252	2500

KEY PERFORMANCE PARAMETERS(T_A=25°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}	±10	V
Drain Current-Continuous(T_C=25°C)(Note 1)	I_D	60	A
Drain Current-Continuous(T_C=100°C)	I_D	42.5	A
Drain Current-Continuous@Current-Pulsed(Note 2)	$I_{DM(pluse)}$	240	A
Maximum Power Dissipation(T_C=25°C)	P_D	50	W
Maximum Power Dissipation(T_C=100°C)	P_D	25	W
Avalanche energy(Note3)	E_{AS}	156	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	°C

THERMAL CHARACTERISTIC

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3	°C/W

Notes 1.The maximum current rating is package limited.
Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature
Notes 3.EAS condition: T_J=25°C, V_{DD}=30V, V_G=4.5V, R_G=25Ω,

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ELECTRICAL CHARACTERISTICS(T_A=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
On/Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	19.5	22	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=19V, V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±10V, V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	0.5	0.7	1.1	V
Forward Transconductance	g_{FS}	V_{DS}=5V, I_D=10A	-	38	-	S
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=2.5V, I_D=10A	-	6.2	9.4	mΩ
		V_{GS}=4.5V, I_D=15A	-	4.8	6.3	mΩ
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=10V, V_{GS}=0V, F=1.0MHz	-	1825	-	pF
Output Capacitance	C_{oss}		-	275	-	pF
Reverse Transfer Capacitance	C_{rss}		-	218	-	pF
Gate resistance	R_g	V_{DS}=0V, V_{GS}=0V, F=1.0MHz	-	1.3	-	Ω
Switching Times						
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=4.5V,V_{DS}=10V, R_L=0.5Ω, R_{GEN}=3Ω	-	5.9	-	nS
Turn-on Rise Time	t_r		-	10.2	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	54	-	nS
Turn-Off Fall Time	t_f		-	16	-	nS
Total Gate Charge	Q_g	V_{DS}=10V, I_D=20A, V_{GS}=4.5V	-	25.3	-	nC
Gate-Source Charge	Q_{gs}		-	2.6	-	nC
Gate-Drain Charge	Q_{gd}		-	9.4	-	nC
Source-Drain Diode Characteristics						
Source-Drain Current(Body Diode)	I_{SD}		-	-	60	A
Forward On Voltage	V_{SD}	V_{GS}=0V, I_S=1A	-	0.78	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	I_F=20A, dI/dt=100A/μs	-	26.5	-	nS
Body Diode Reverse Recovery Charge	Q_{rr}	I_F=20A, dI/dt=100A/μs	-	25	-	nC

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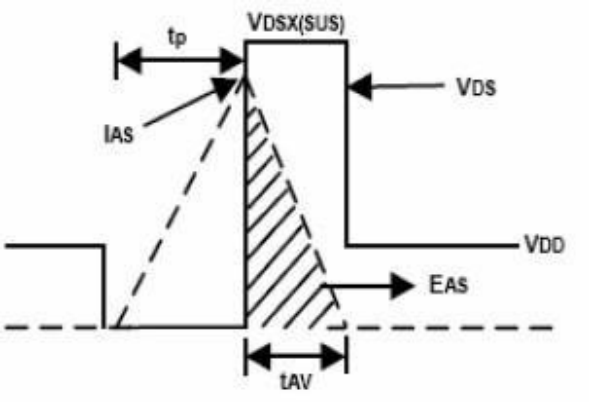
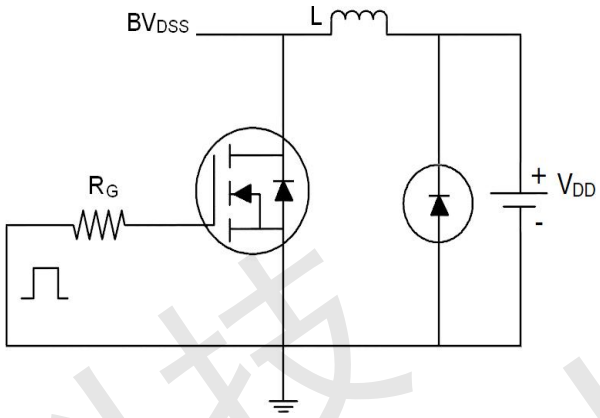
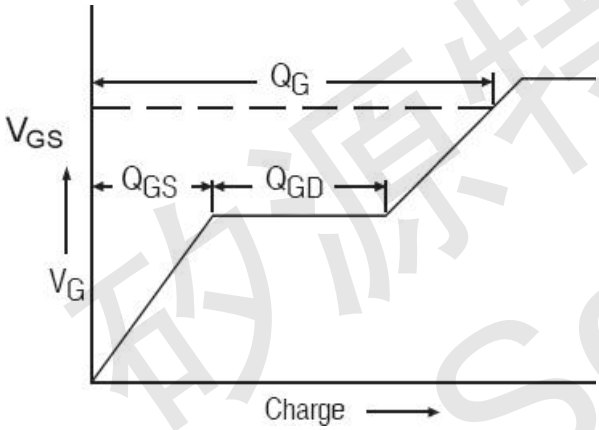
TEST CIRCUIT

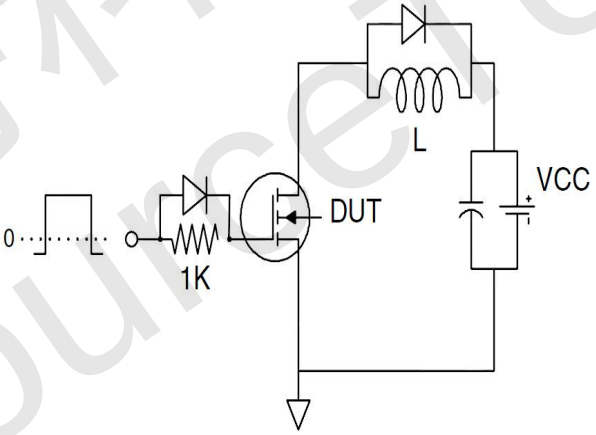
1) E_{AS} Test Circuits



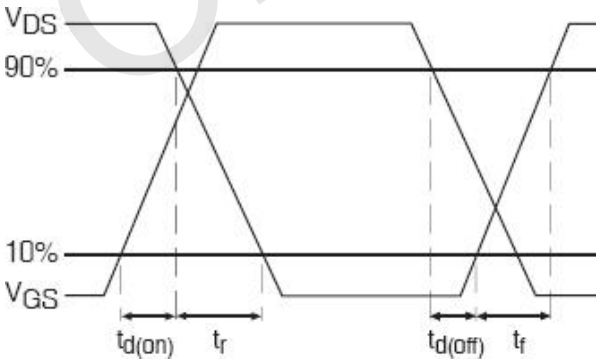


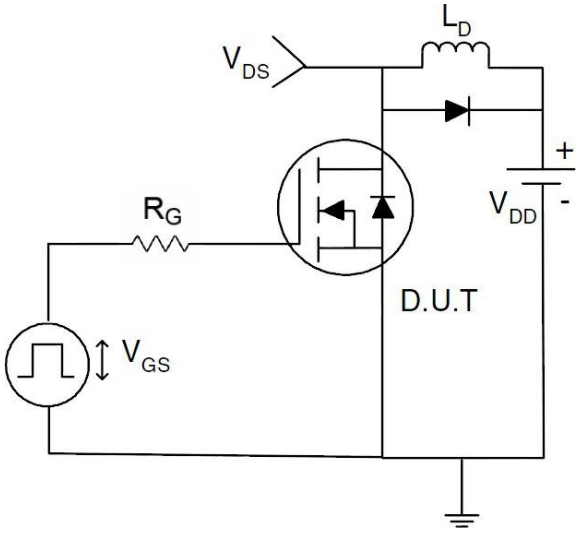
2) Gate Charge Test Circuit





3) Switch Time Test Circuit





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TYPICAL PERFORMANCE CHARACTERISTICS

Figure1. Output Characteristics

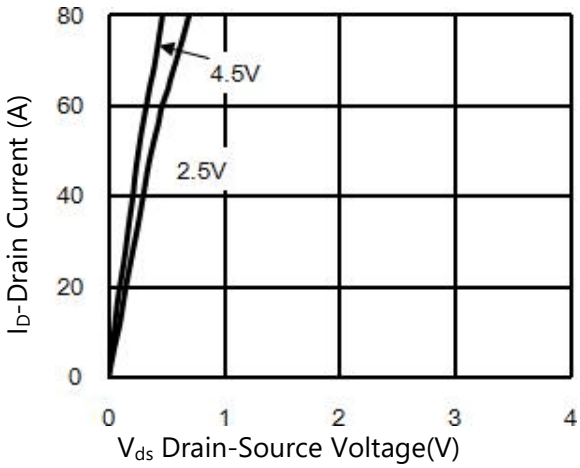


Figure2. Transfer Characteristics

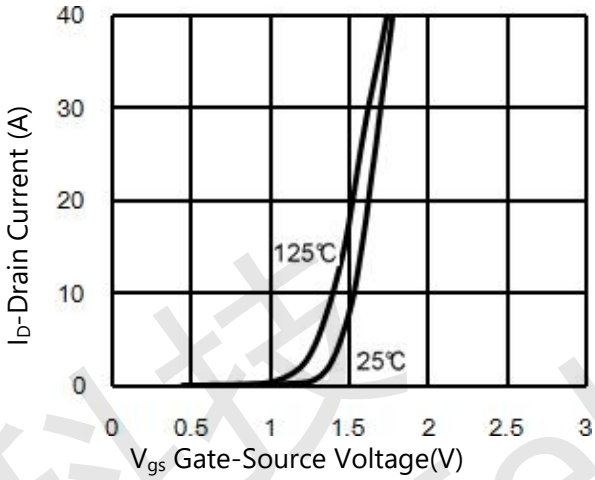


Figure3. Power Dissipation

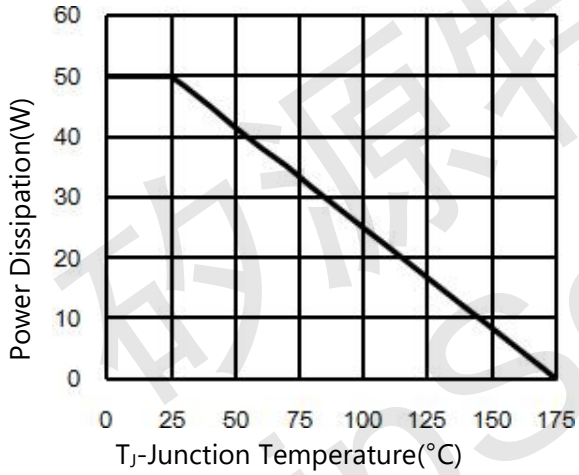


Figure4. Drain Current

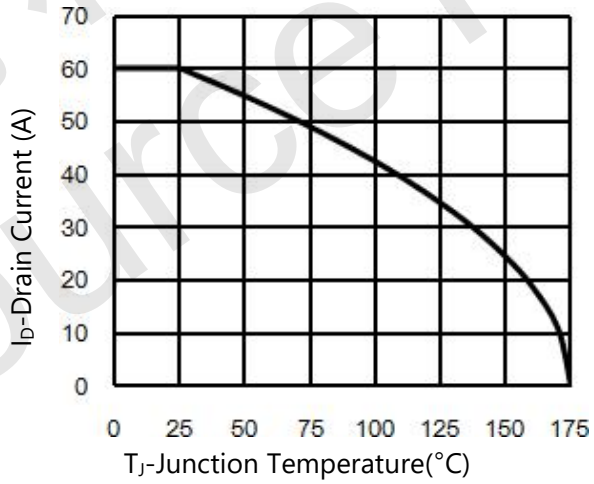


Figure5. $V_{GS(th)}$ vs Junction Temperature

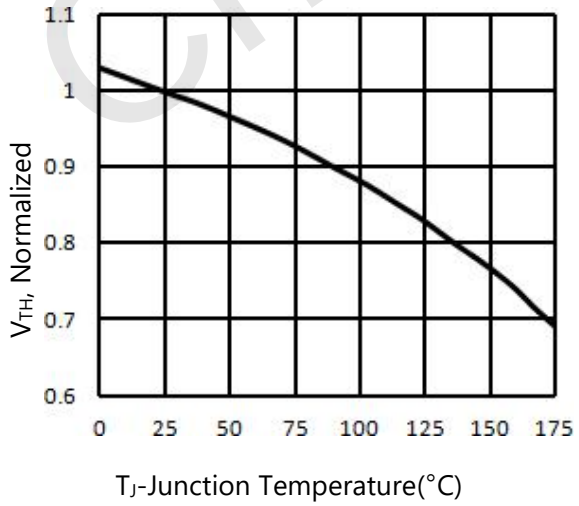
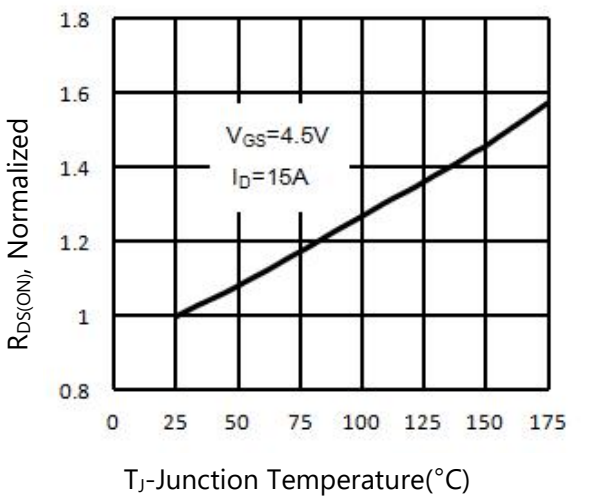


Figure6. $R_{DS(ON)}$ vs Junction Temperature



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TYPICAL PERFORMANCE CHARACTERISTICS

Figure7. Gate Charge Waveforms

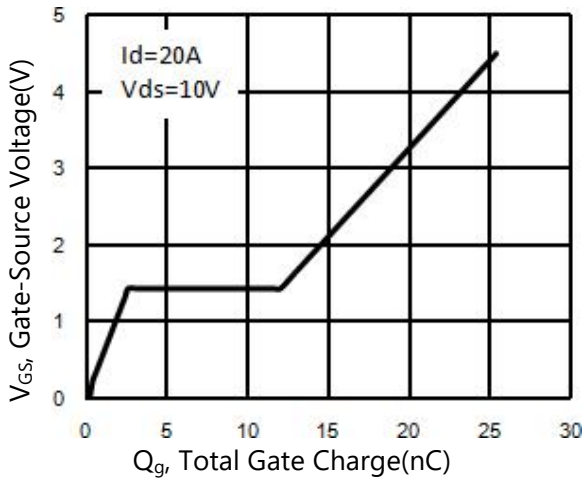


Figure8. Capacitance

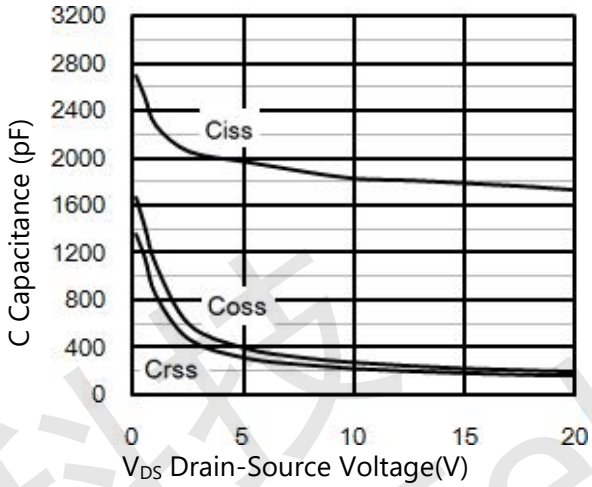


Figure9. Body-Diode Characteristics

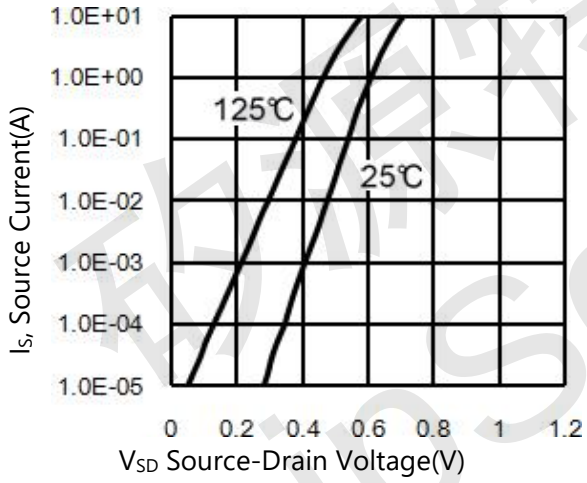
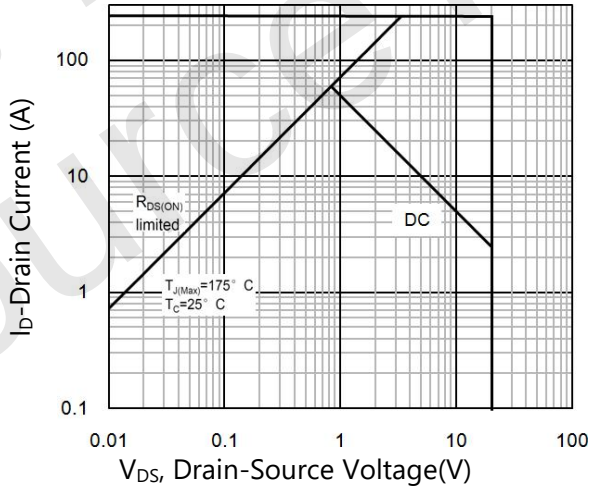


Figure10. Maximum Safe Operating Area



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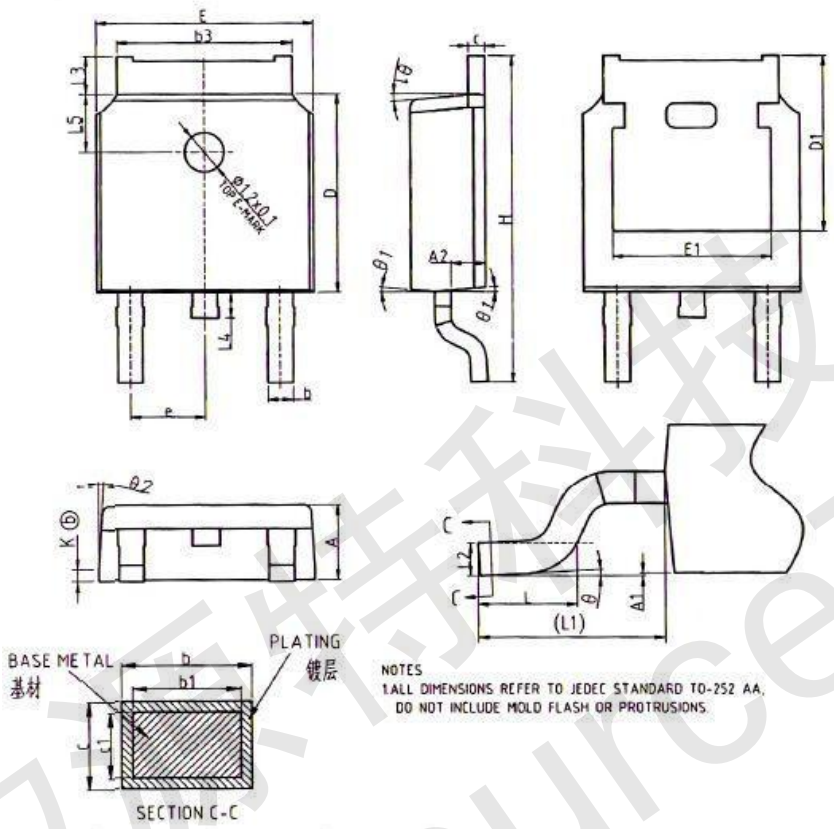
PACKAGE INFORMATION

TO-252



SYMBOL	Dimensions In Millimeters		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	-	0.10
A2	0.97	1.07	1.17
b	0.72	0.78	0.85
b1	0.71	0.76	0.81
b3	5.23	5.33	5.46
c	0.47	0.53	0.58
c1	0.46	0.51	0.56
D	6.00	6.10	6.20
D1		5.30REF	
E	6.50	6.60	6.70
E1	4.70	4.83	4.92
e		2.286BSC	
H	9.90	10.10	10.30
L	1.40	1.50	1.70
L1		2.90REF	
L2		0.51BSC	
L3	0.90	-	1.25
L4	0.60	0.80	1.00
L5	1.70	1.80	1.90
θ	0°	-	8°
θ1	5°	7°	9°
θ2	5°	7°	9°
K		0.40REF	

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