DESCRIPTION

The MX2N7002K uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

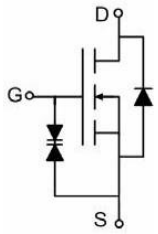
GENERAL FEATURES

- V_{DS}=60V, I_D=0.25A
  $R_{DS(ON)}$(Typ.)=2.05Ω @ V_{GS}=4.5V
  $R_{DS(ON)}$(Typ.)=1.69Ω @ V_{GS}=10V
- Advanced Trench Technology
- Excellent $R_{DS(ON)}$ and Low Gate Charge
- Lead free prduct is acquired
- ESD Protected: 2KV

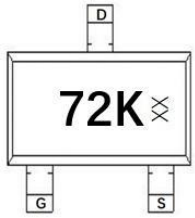
APPLICATION

- Battery Operated Systems
- Direct logic-level Interface: TTL/CMOS
- Solid-State Relays

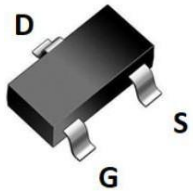
PINOUT



Schematic diagram



Marking and pin Assignment



SOT-23 top view

ORDERING INFORMATION

Part Number	StorageTemperature	Package	Devices Per Reel
MX2N7002K	-55°C to 150°C	SOT-23	3000

ABSOLUTE MAXIMUM RATINGS(T_A=25°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	I_D	0.25	A
Drain Current-Continuous(T_A=100°C)	I_D	0.16	A
Pulsed Drain Current(Note1)	I_{DM}	1	A
Maximum Power Dissipation	P_D	0.23	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C

THERMAL RESISTANCE

Thermal Resistance, Junction-to-Ambient(Note2)	$R_{\theta JA}$	543	°C/W

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

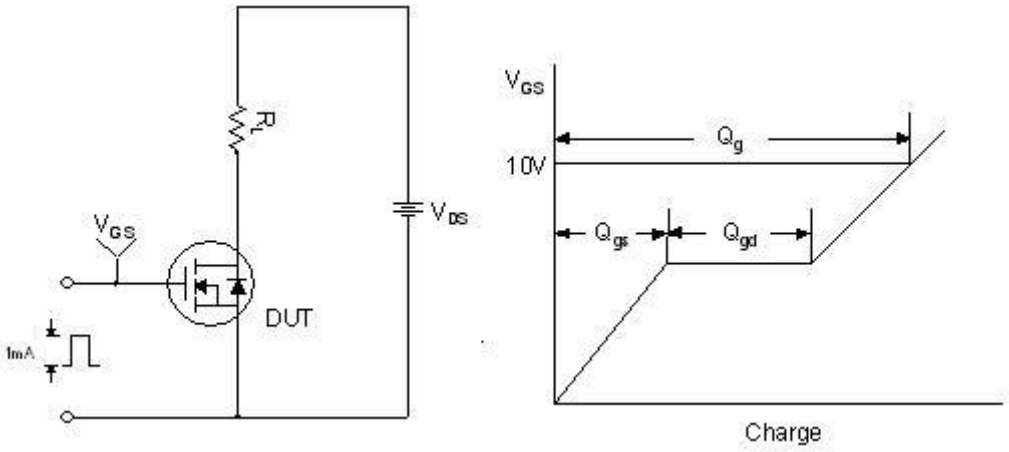
ELECTRICAL CHARACTERISTICS(T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±10	μA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1	1.6	2.5	V
Drain-Source On-State Resistance(Note2)	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=0.2A	-	2.05	2.87	Ω
		V_{GS}=10V, I_D=0.3A	-	1.69	2.2	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, F=1.0MHz	-	28	-	pF
Output Capacitance	C_{oss}		-	11	-	pF
Reverse Transfer Capacitance	C_{rss}		-	4	-	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V, I_D=0.2A, V_{GS}=10V,R_{GEN}=10Ω	-	10	-	nS
Turn-on Rise Time	t_r		-	50	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	17	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	V_{DS}=10V, I_D=0.3A, V_{GS}=4.5V	-	1.7	-	nC
Gate-Source Charge	Q_{gs}		-	0.3	-	nC
Gate-Drain Charge	Q_{gd}		-	0.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=0.25A	-	-	1.2	V
Diode Forward Current	I_S		-	-	0.25	A
Pulsed Diode Forwad Current	I_{SM}		-	-	1	A

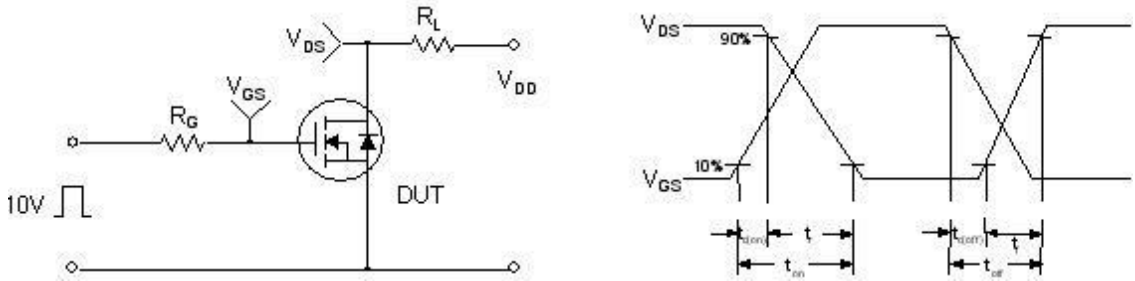
Note 2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

TEST CIRCUIT

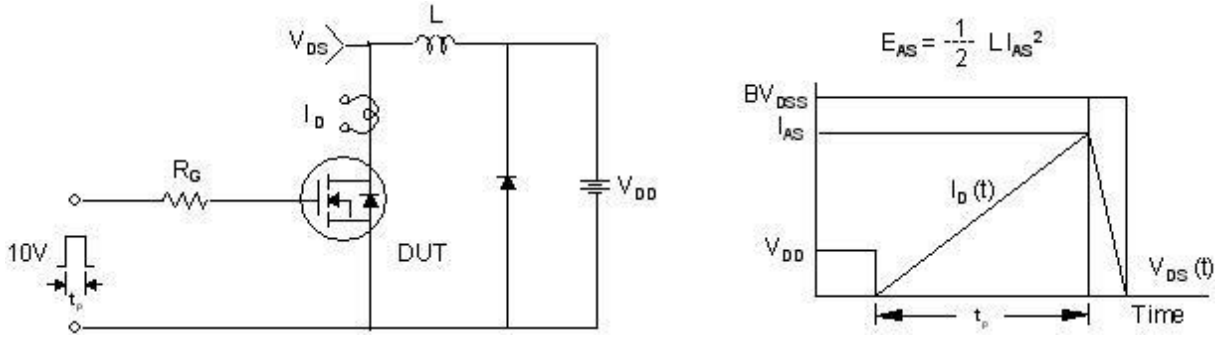
1) Gate Charge Test Circuit & Waveforms



2) Resistive Switching Test Circuit & Waveforms



3) Unclamped Inductive Switching Test Circuit & Waveforms



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Output Characteristics

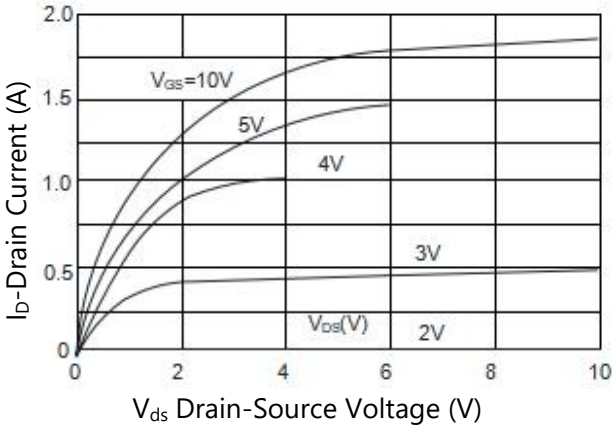


Figure 2. Transfer Characteristics

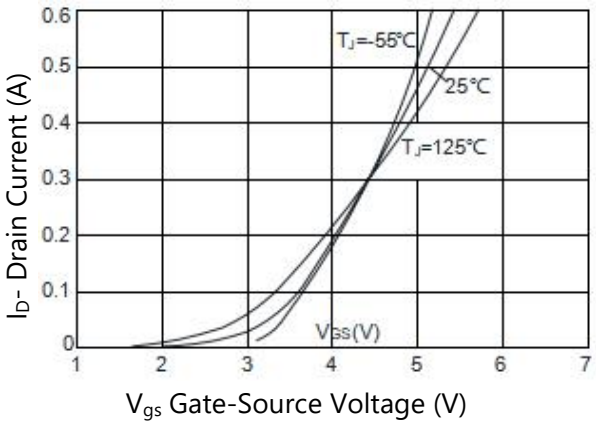


Figure 3. On-resistance vs Drain Current

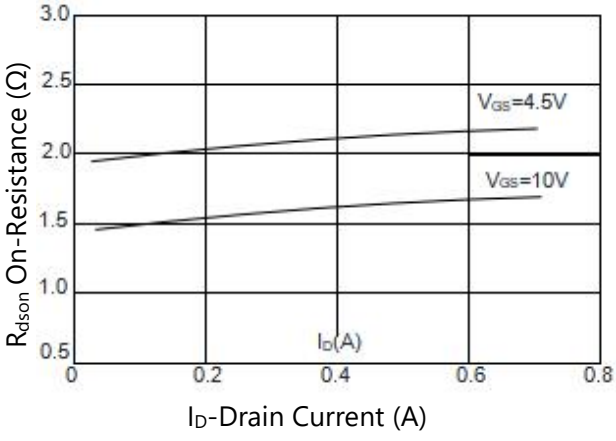


Figure 4. Source-Drain Diode Forward

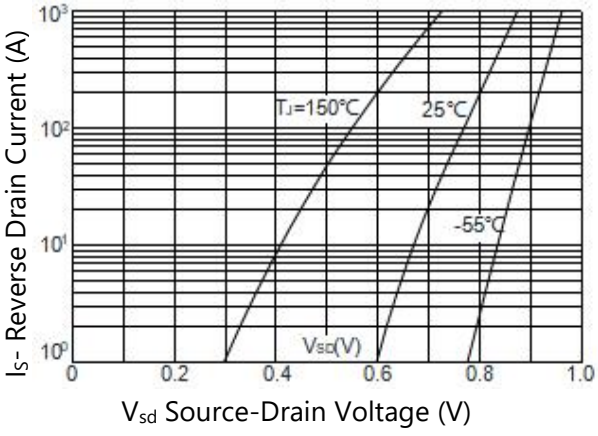


Figure 5. Gate Charge

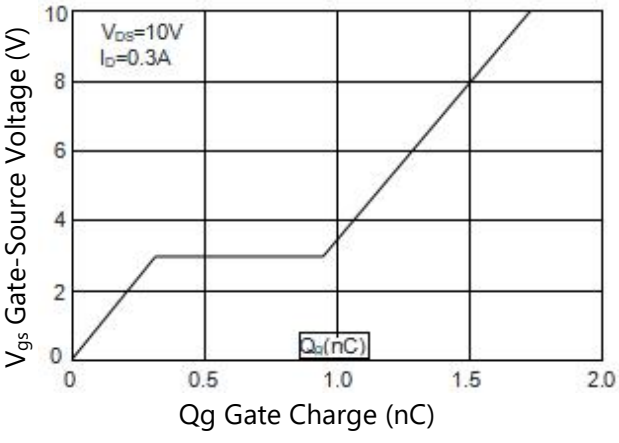
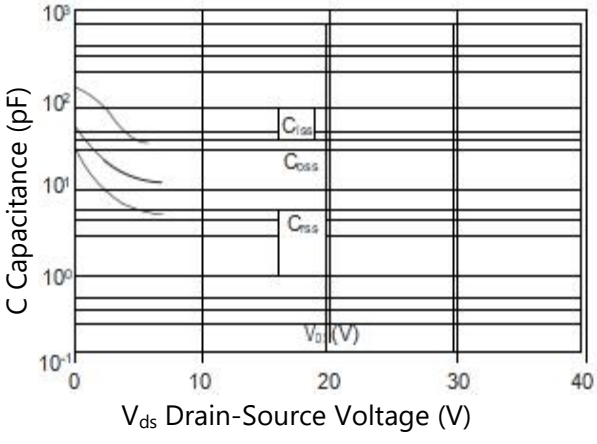
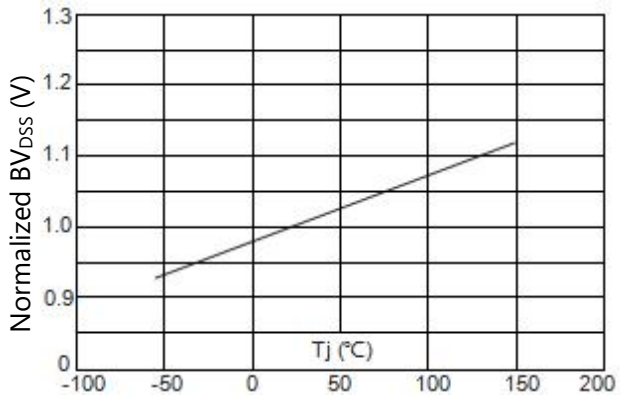


Figure 6. Capacitance Characteristics



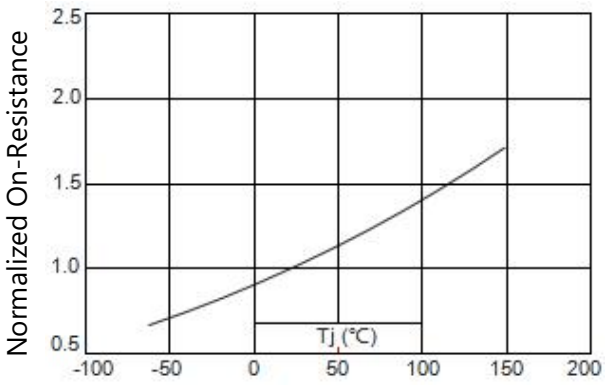
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7. BV_{DSS} vs Junction Temperature



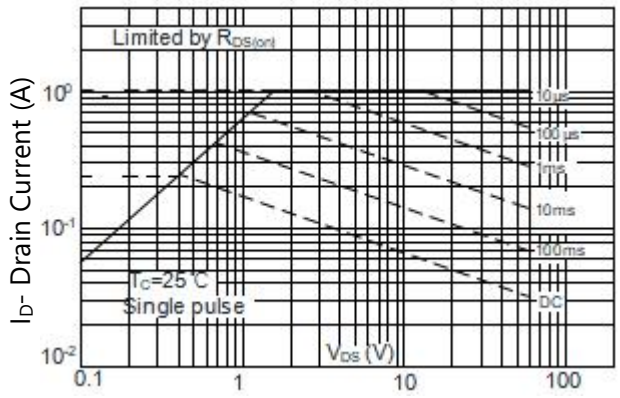
T_J-Junction Temperature (°C)

Figure 8. R_{dson} vs Junction Temperature



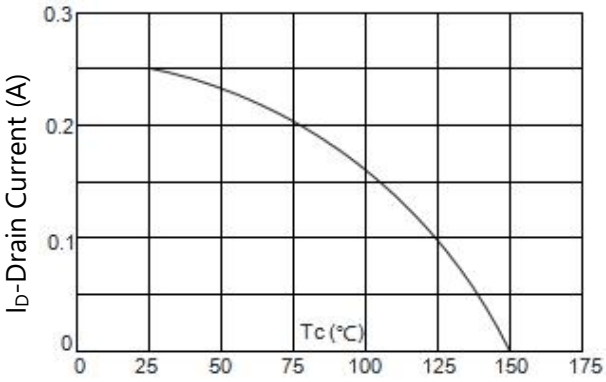
T_J-Junction Temperature(°C)

Figure 9. Safe Operation Area



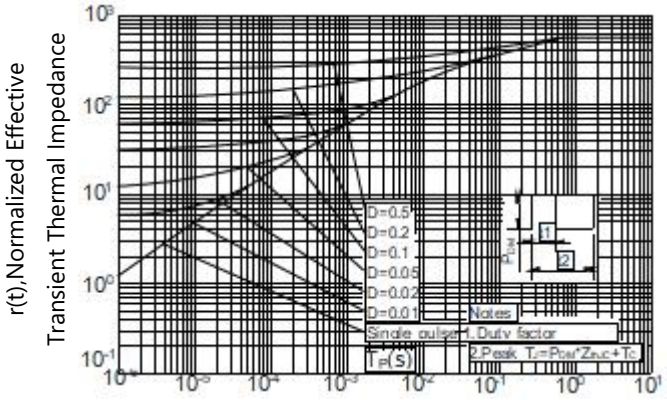
V_{ds} Drain-Source Voltage (V)

Figure 10. Drain Current vs Case Temperature



T_C-Case Temperature(°C)

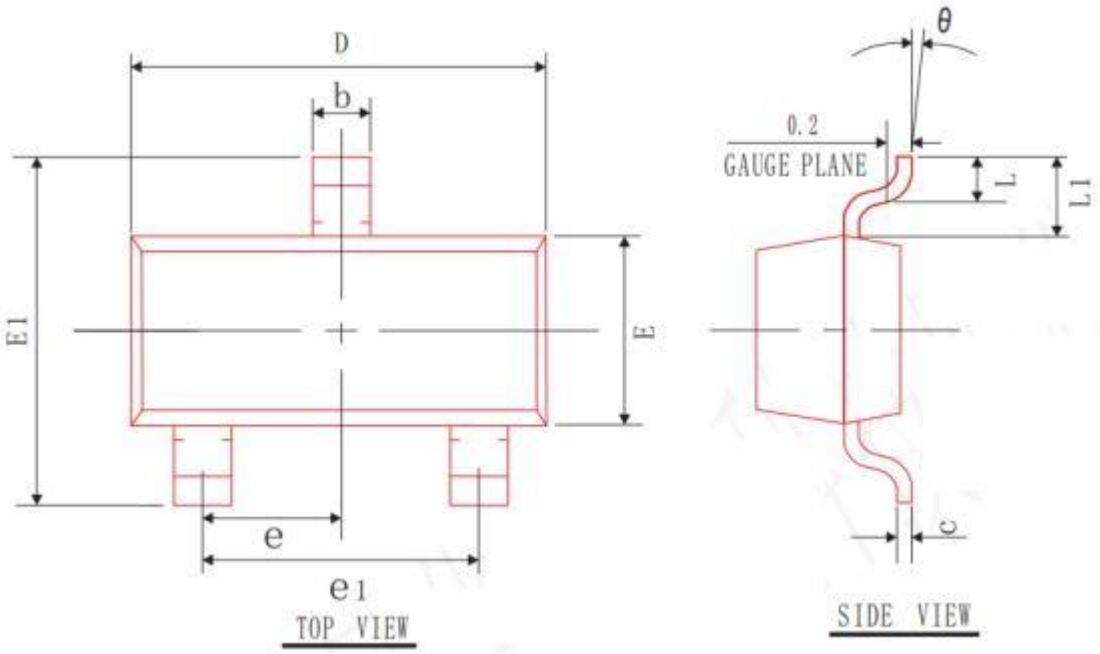
Figure 11. Normalized Maximum Transient Thermal Impedance



Square Wave Pulse Duration(sec)

PACKAGE INFORMATION

SOT-23



Symbol	Dimensions in Millimeters		
	Min.	Nom.	Max.
A	0.90	1.05	1.20
A1	0.00	0.05	0.10
A2	0.90	1.00	1.10
b	0.30	0.40	0.50
c	0.08	0.10	0.15
D	2.80	2.90	3.00
E	1.20	1.30	1.40
E1	2.30	2.40	2.50
L	0.30	0.40	0.50
θ	0°	5°	10°
L1	0.55 REF		
e	0.95 REF		
e1	1.90 REF		