

DESCRIPTION

The MX0103A uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge. It can be used in a wide variety of applications.

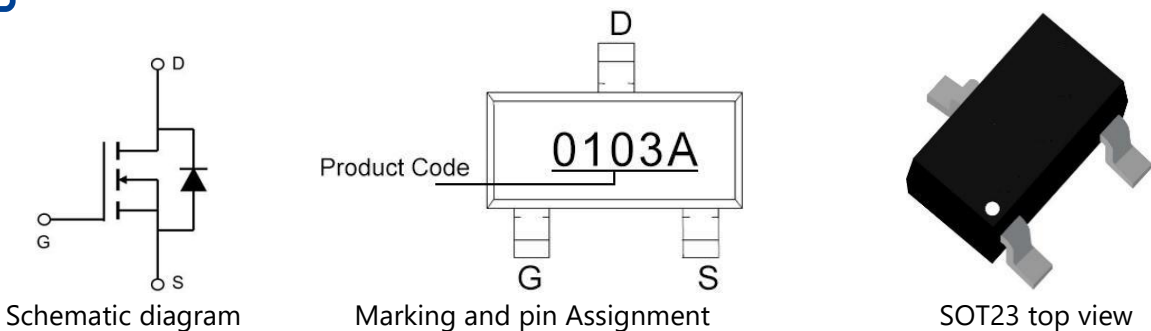
GENERAL FEATURES

- $V_{DS}=100V$, $I_D=2.5A$
 $R_{DS(ON)}$ (Typ.)=140m Ω @ $V_{GS}=10V$
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

APPLICATION

- Battery management
- Motor controller and driver
- PWM applications
- Load switch

PINOUT



ORDERING INFORMATION

Part Number	Storage Temperature	Package	Devices Per Reel
MX0103A	-55°C to 150°C	SOT-23	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	2.5	A
Drain Current-Continuous ($T_C=100^\circ\text{C}$)	I_D	1.4	A
Pulsed Drain Current ^(Note1)	I_{DM}	7.5	A
Maximum Power Dissipation	P_D	1.0	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

THERMAL RESISTANCE

Thermal Resistance, Junction-to-Case ^(Note2)	$R_{\theta JC}$	125	$^\circ\text{C/W}$
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Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

Note 2. Surface Mounted on FR4 Board, $t \leq 10$ sec.


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

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	100	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics ^(Note2)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=2A$	-	140	175	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=2A$	-	10	-	S
Dynamic Characteristics ^(Note3)						
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	415	-	pF
Output Capacitance	C_{oss}		-	30	-	pF
Reverse Transfer Capacitance	C_{rss}		-	25	-	pF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=50V, I_D=2A,$ $R_L=1\Omega,$ $V_{GS}=10V, R_G=3\Omega$	-	8	-	nS
Turn-on Rise Time	t_r		-	3	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	17	-	nS
Turn-Off Fall Time	t_f		-	4.5	-	nS
Total Gate Charge	Q_g	$V_{DS}=50V, I_D=2A,$ $V_{GS}=10V$	-	15	-	nC
Gate-Source Charge	Q_{gs}		-	2	-	nC
Gate-Drain Charge	Q_{gd}		-	4	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note2)	V_{SD}	$V_{GS}=0V, I_S=2A$	-	-	1.2	V
Diode Forward Current ^(Note1)	I_S		-	-	2	A

Note 1. Surface Mounted on FR4 Board, $t \leq 10$ sec.

Note 2. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.

Note 3. Guaranteed by design, not subject to product.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Switching Test Circuit

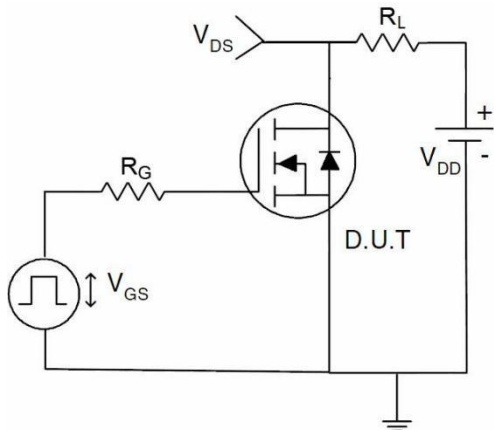


Figure 2. Switching Waveform

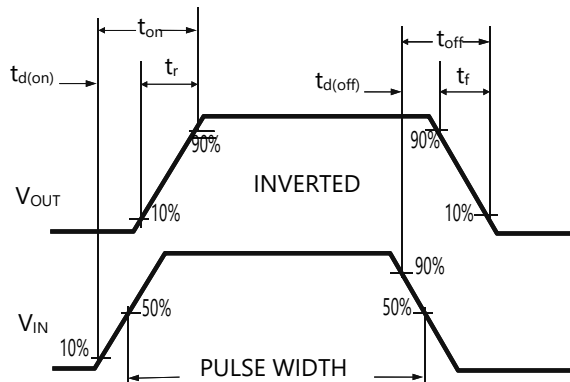


Figure 3. Power De-rating

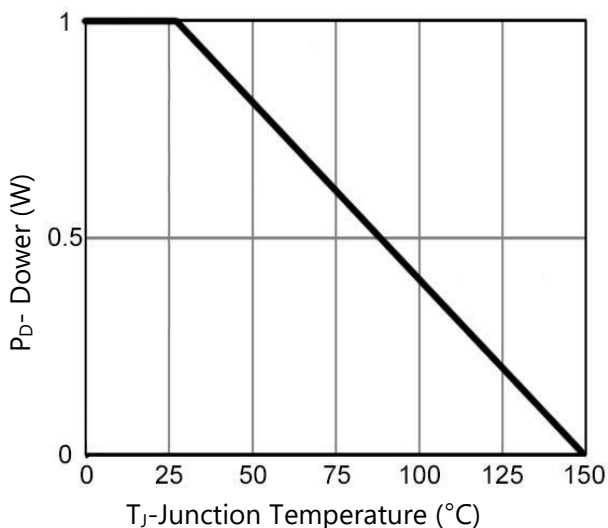


Figure 4. Drain Current

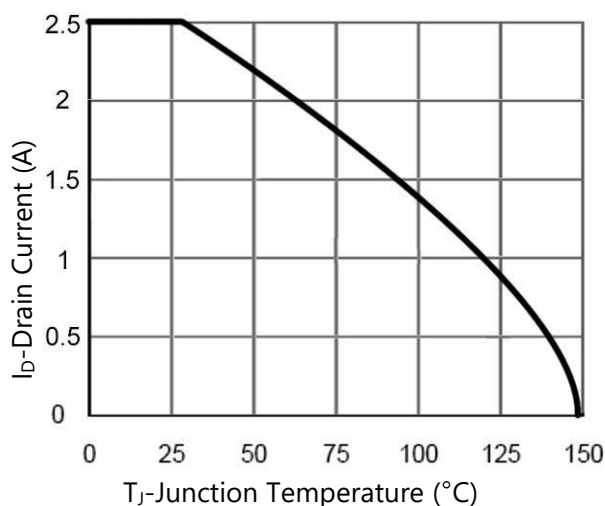


Figure 5. Output Characteristics

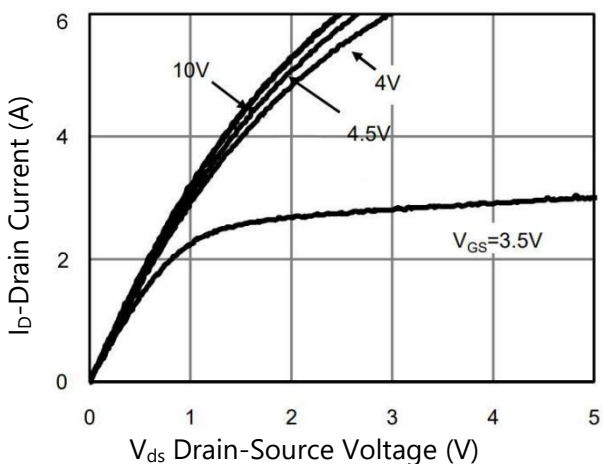
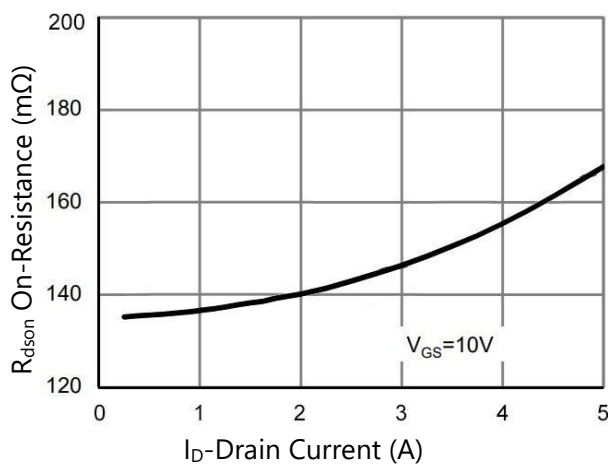


Figure 6. R_{ds(on)} vs Drain Current



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7. Transfer Characteristics

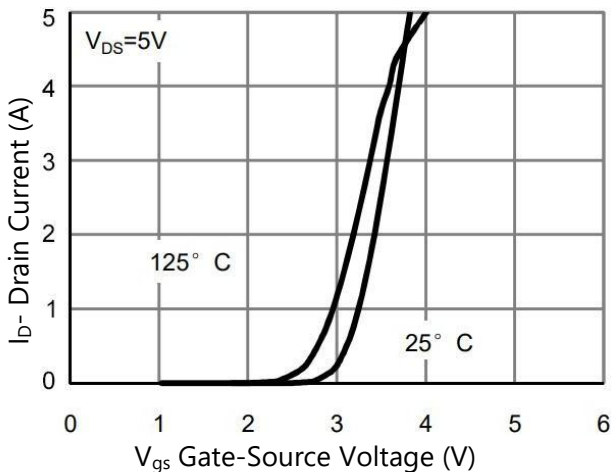


Figure 8. R_{dson} vs Junction Temperature

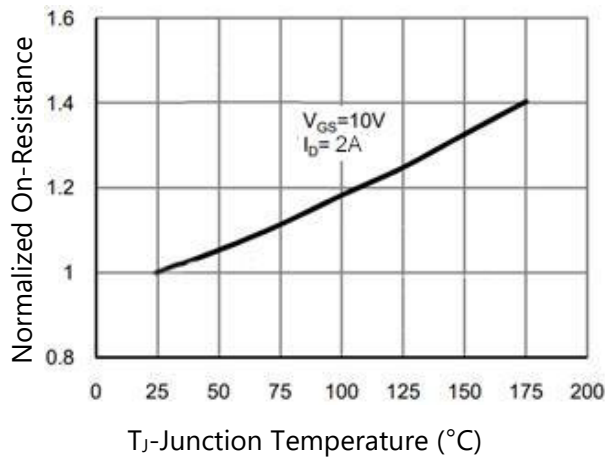


Figure 9. R_{dson} vs V_{gs}

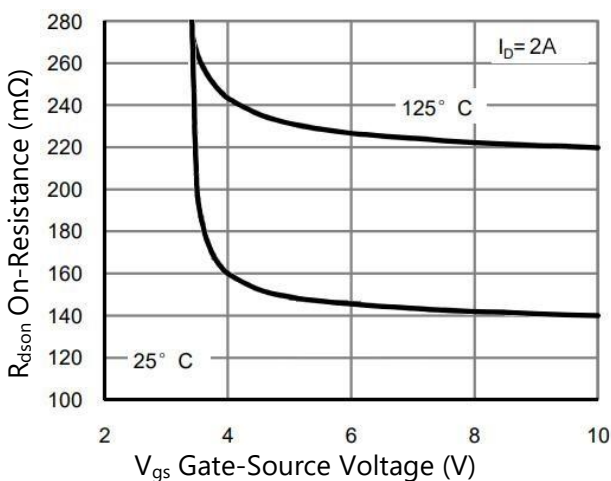


Figure 10. Capacitance vs V_{DS}

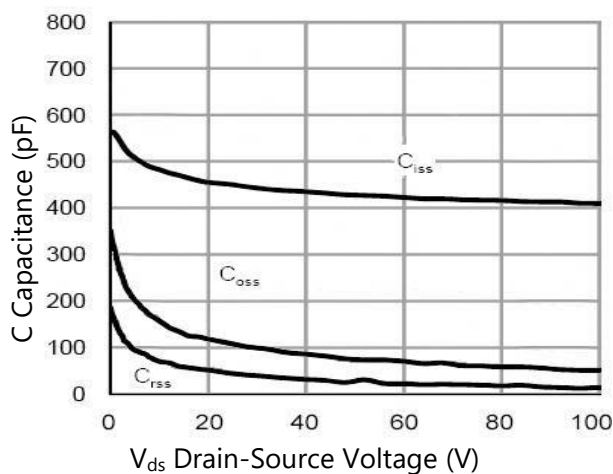


Figure 11. Gate Charge

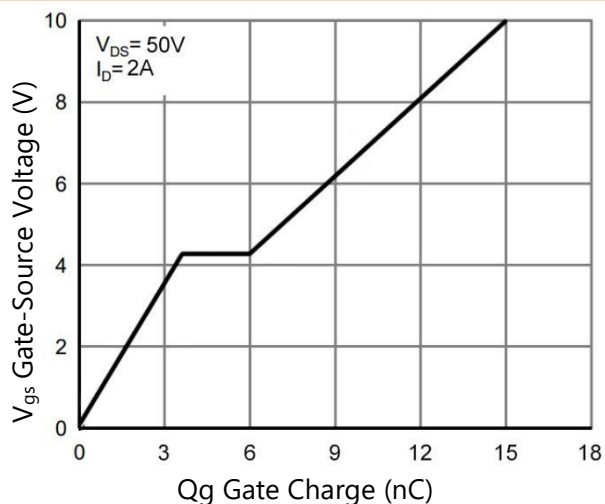
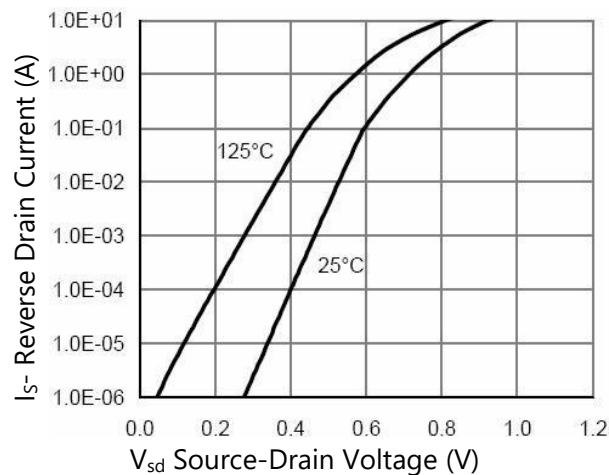


Figure 12. Source- Drain Diode Forward



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 13. Safe Operation Area

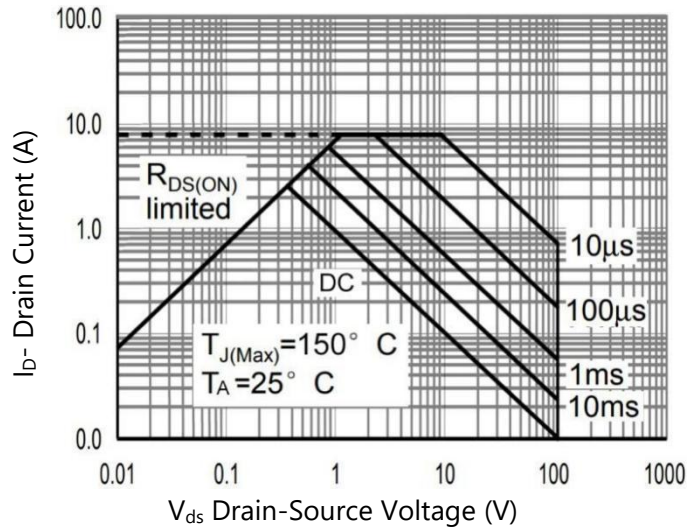
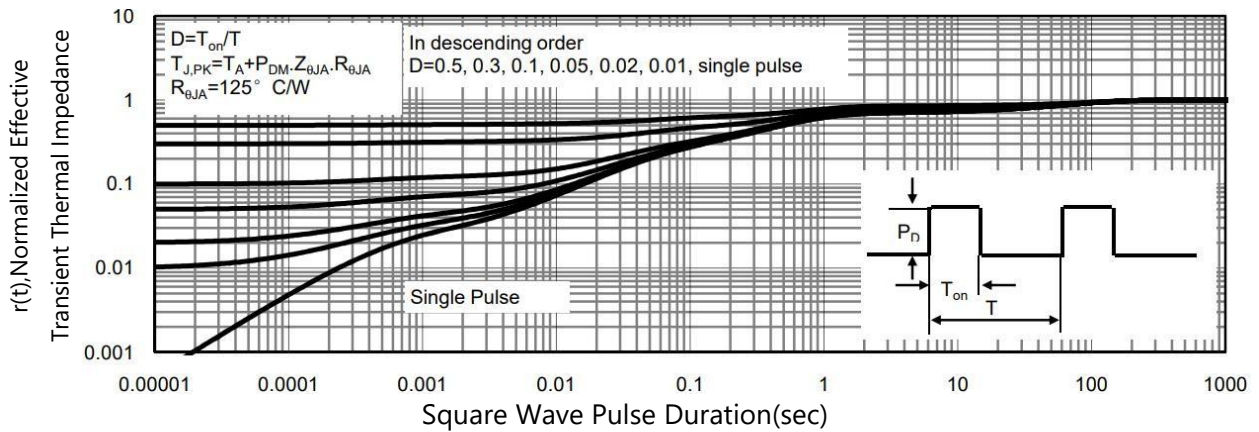
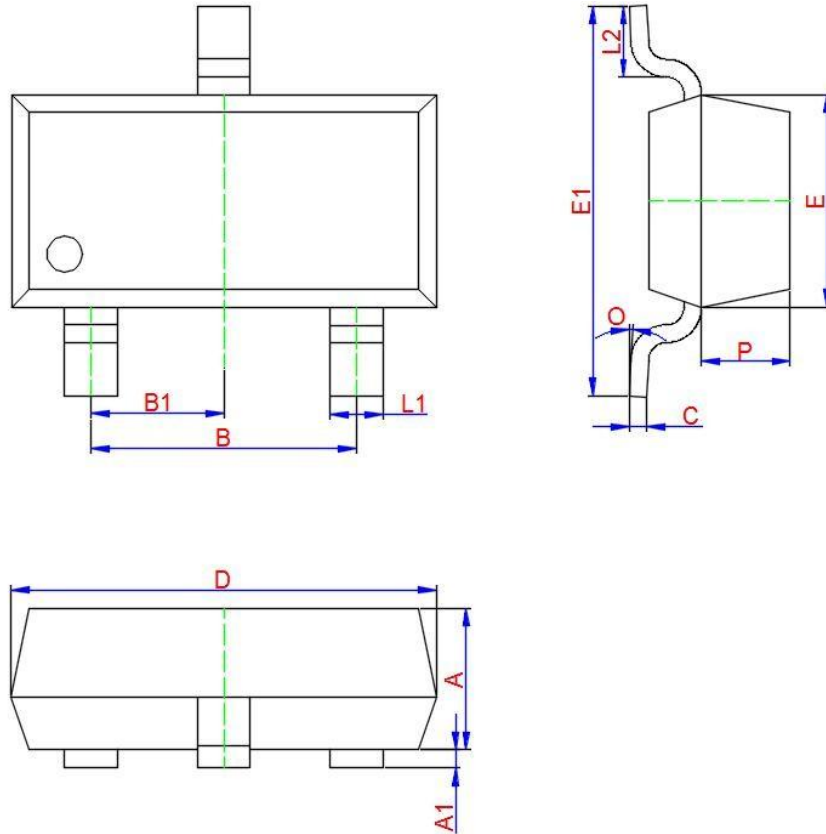


Figure 14. Normalized Maximum Transient Thermal Impedance



PACKAGE INFORMATION

SOT-23



Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.900	1.000	1.100
A1	0.000	0.050	0.100
L1	0.300	0.400	0.500
C	0.100	0.110	0.120
D	2.800	2.900	3.000
E	1.250	1.300	1.350
E1	2.250	2.400	2.550
B	1.800	1.900	2.000
B1	0.950 TYP.		
L2	0.200	0.350	0.450
P	0.550	0.575	0.600
O	0°	4°	8°