AT9P8SP040MQSP-Q1

P-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-40V	12.3mΩ@-10V	-9.8A
	24mΩ@-4.5V	

Feature

- Low $R_{DS(ON)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Suffix “-Q1” for AEC-Q101

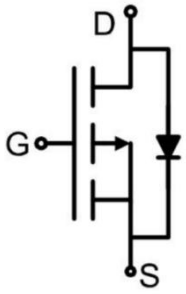
Application

- Reverse polarity protection
- Load switch

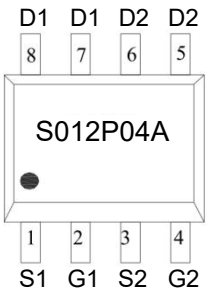
Package

SOP-8

Circuit diagram



Marking



Absolute maximum ratings (T_A=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current[1,2] (V_{GS} = -10V)	I_D	-9.8	A
Continuous Drain Current[1,2] (V_{GS} = -10V, T_A=100℃)	I_D(100℃)	-6.2	A
Pulsed Drain Current(t_p ≤10us)	I_{DM}	-80	A
Single Pulse Avalanche Energy[3]	E_{AS}	96	mJ
Power Dissipation[1,2]	P_D	2.01	W
Thermal Resistance Junction to Ambient[2]	$R_{\theta JA}$	62	℃/W
Operating Junction Temperature	T_J	-55 ~ +150	℃
Storage Temperature	T_{STG}	-55 ~ +150	℃

Electrical characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} =0V, I_D =-250μA	-40			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-40V, V_{GS} =0V			-1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±20V			±100	nA
SGate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1.3	-1.8	-2.3	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =-10V, I_D =-9A		10.2	12.3	mΩ
		V_{GS} =-4.5V, I_D =-5A		16.1	24	
Dynamic characteristics[5]						
Input Capacitance	C_{iss}	V_{DS} =-20V, V_{GS} =0V, f =1MHz		2650		pF
Output Capacitance	C_{oss}			265		
Reverse Transfer Capacitance	C_{rss}			240		
Total Gate Charge	Q_g	V_{DS} =-20V, V_{GS} =-10V, I_D =-9A		58.7		nC
Gate-Source Charge	Q_{gs}			7.5		
Gate-Drain Charge	Q_{gd}			11.9		
Turn-on delay time	$t_{d(on)}$	V_{DS} =-20V, V_{GS} =-10V, I_D =-9A R_G =3Ω		10		nS
Turn-on rise time	t_r			12		
Turn-off delay time	$t_{d(off)}$			85		
Turn-off fall time	t_f			47		
Source-Drain Diode characteristics						
Diode Forward Current	I_S	T_A=25℃			-9.8	A
Diode Forward voltage	V_{SD}	V_{GS} =0V, I_S =-9A			-1.2	V
Reverse Recovery Time	T_{rr}	V_{GS} =0V, V_R =-20V, I_F =-9A di/dt =-100A/μs		24		nS
Reverse Recovery Charge	Q_{rr}			28		nC

Notes:

1) The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.

2) The value of $R_{\theta JA}$ is measured with the device mounted on the 80mm*80mm*1.1mm single layer FR-4 PCB board with 1 in^2 pad of 2oz.Copper, in the still air environment with T_A =25℃. The maximum allowed junction temperature of 150℃. The value in any given application depends on the user's specific board design.

3) T_J=25℃, V_G =-10V, R_G =25Ω, L =0.5mH, I_{AS} =-19.6A.

4) Guaranteed by design, not subject to production.

Typical Characteristics

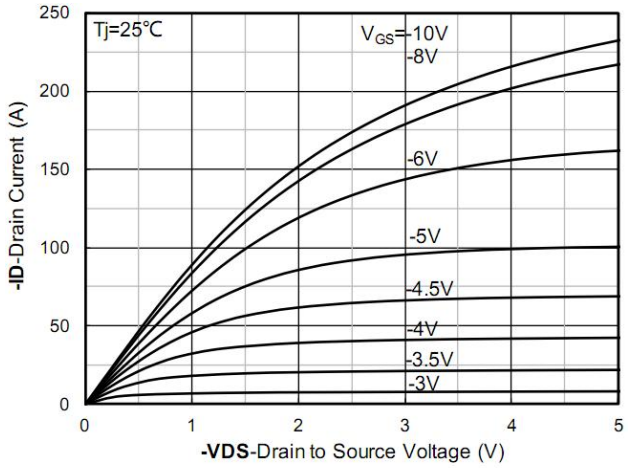


Figure 1. Output Characteristics; typical values

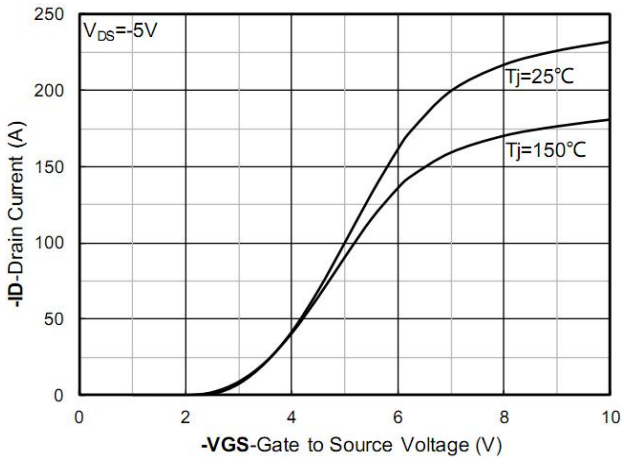


Figure 2. Transfer Characteristics; typical values

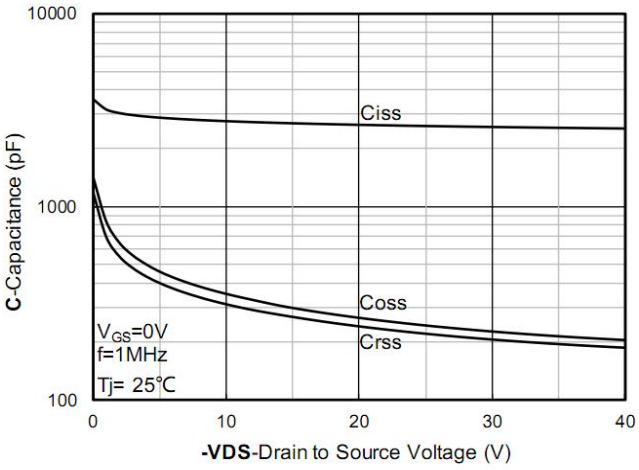


Figure 3. Capacitance Characteristics; typical values

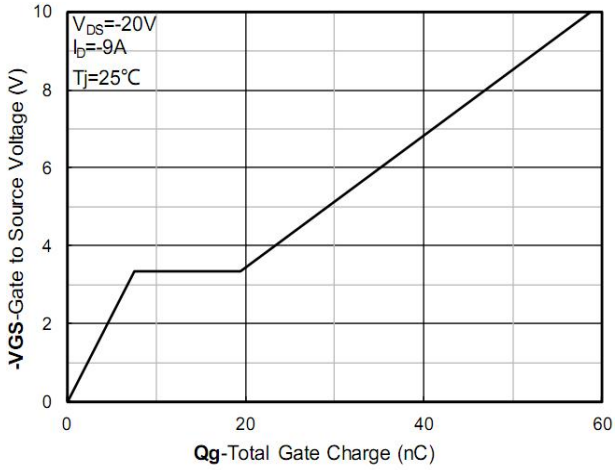


Figure 4. Gate Charge; typical values

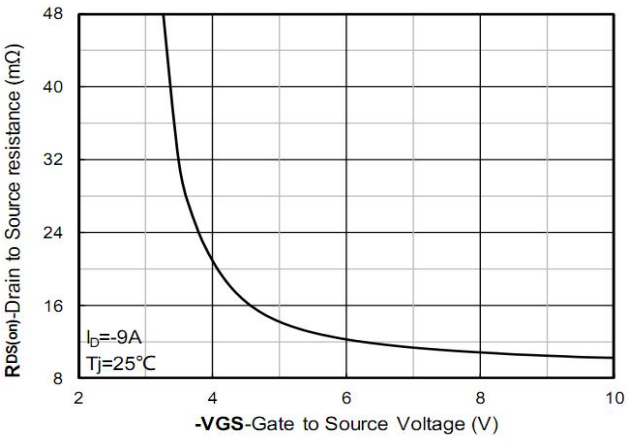


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

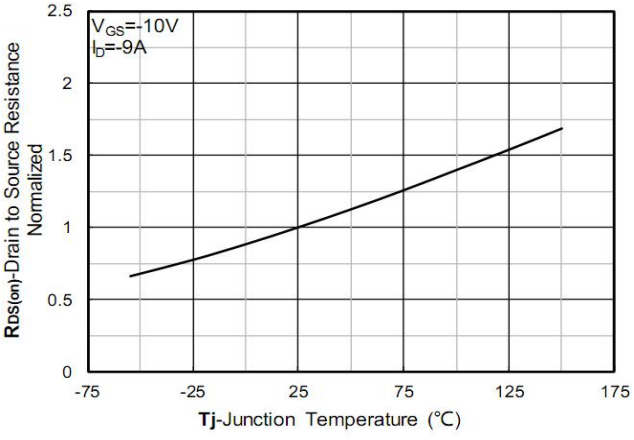


Figure 6. Normalized On-Resistance

Typical Characteristics

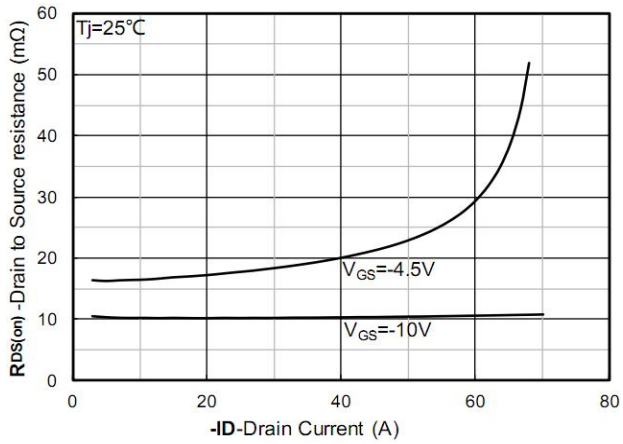


Figure 7. $R_{DS(on)}$ vs. Drain Current; typical values

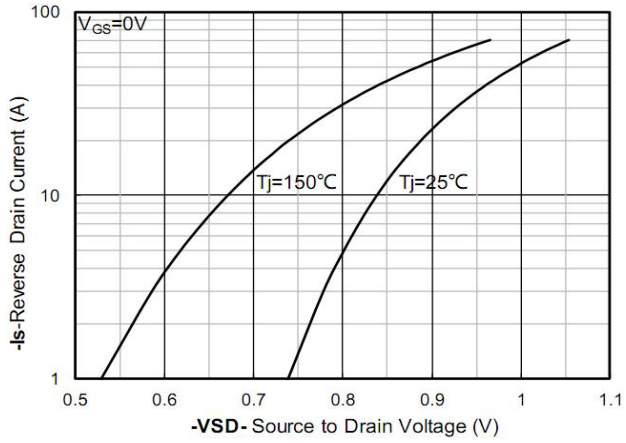


Figure 8. Forward characteristics of reverse diode; typical values

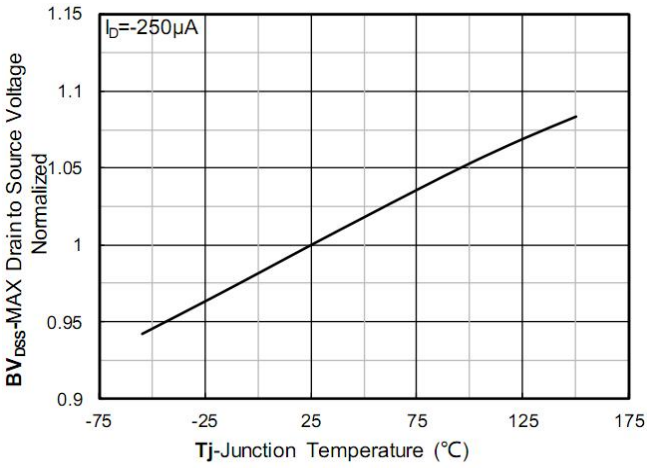


Figure 9. Normalized breakdown voltage

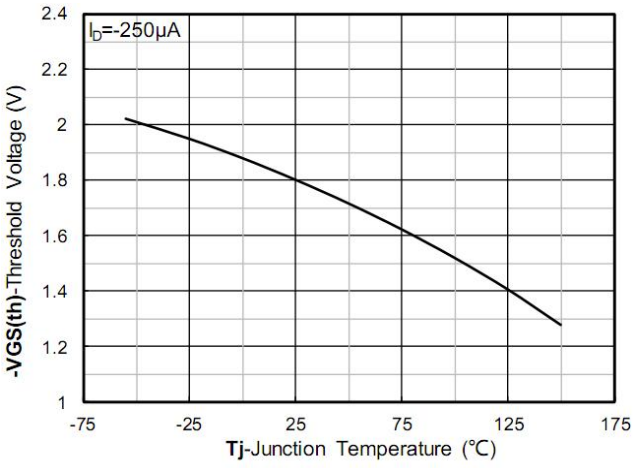


Figure 10. Gate Threshold voltage; typical values

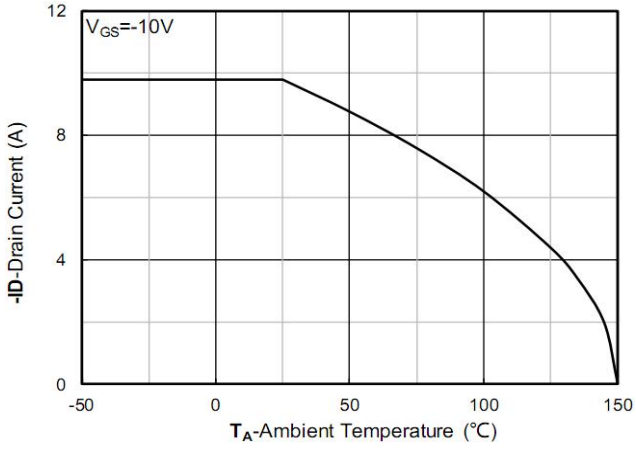


Figure 11. Current dissipation

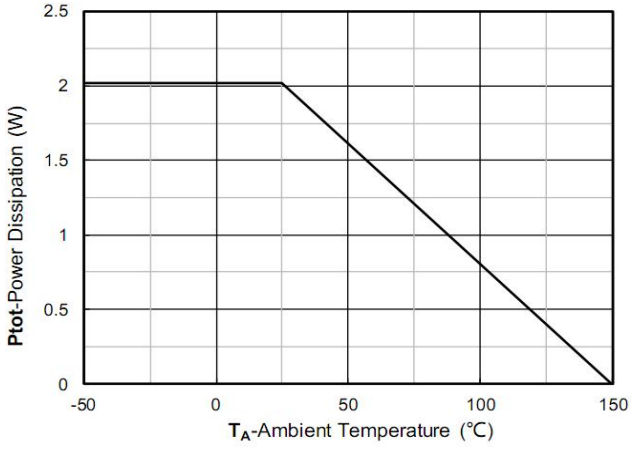


Figure 12. Power dissipation

Typical Characteristics

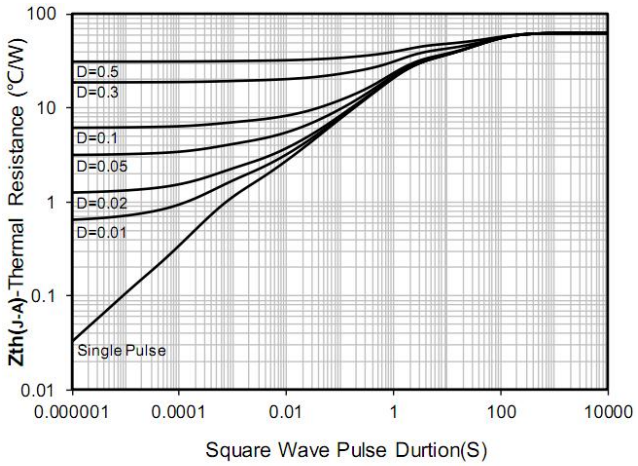


Figure 13. Maximum Transient Thermal Impedance

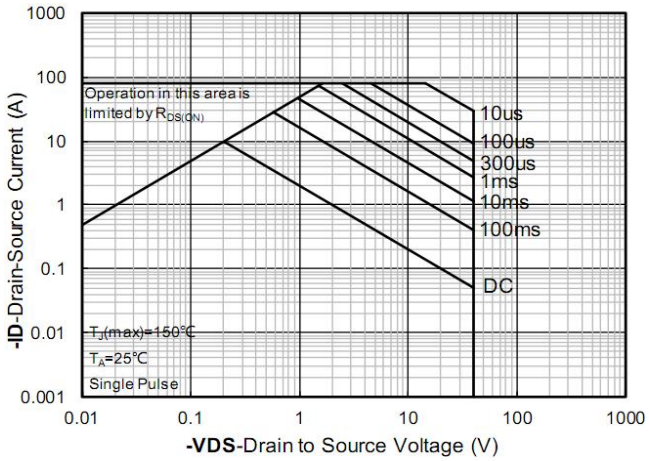
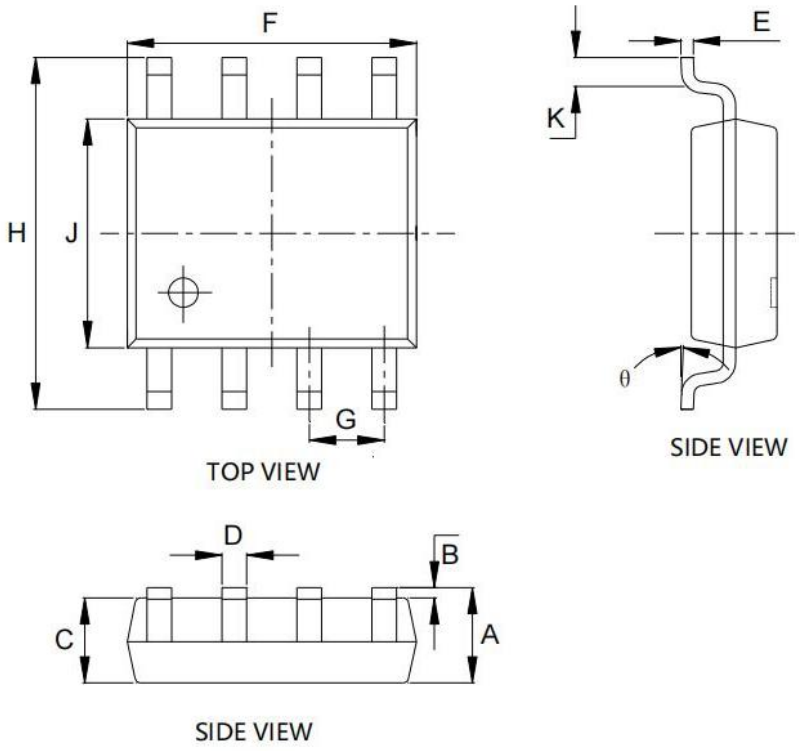


Figure 14. Safe Operation Area

SOP-8 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
B	0.100	0.250	0.004	0.010
C	1.350	1.550	0.053	0.061
D	0.330	0.510	0.013	0.020
E	0.170	0.250	0.007	0.010
F	4.800	5.000	0.189	0.197
G	1.270 BSC.		0.050 BSC.	
H	5.800	6.200	0.228	0.244
J	3.800	4.000	0.150	0.157
K	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°