AT009SP060MQTA-Q1

P-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-60V	210mΩ@-10V	-9A
	220mΩ@-4.5V	

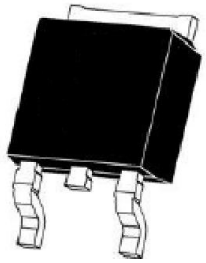
Feature

- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation
- Suffix “-Q1” for AEC-Q101

Application

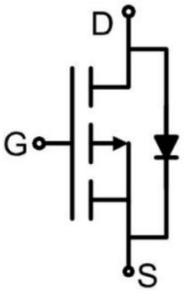
- Load switch
- PWM application

Package

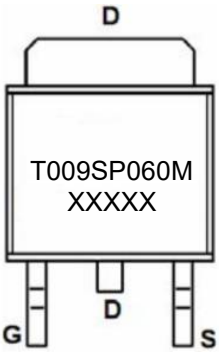


TO-252AB

Circuit diagram



Marking



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	-9	A
Pulsed Drain Current[1]	I_{DM}	-36	A
Single Pulse Avalanche Energy[2]	E_{AS}	24	mJ
Power Dissipation	P_D	40	W
Thermal Resistance Junction to Case[3]	$R_{\theta JC}$	3.75	℃/W
Operating Junction Temperature	T_J	-55 ~ +175	℃
Storage Temperature	T_{STG}	-55 ~ +175	℃

Electrical characteristics (T_C=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	-60			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-60V, V_{GS} =0V			-1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±20V			±100	nA
Gate threshold voltage[4]	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1.4	-2	-2.6	V
Drain-source on-resistance[4]	$R_{DS(on)}$	V_{GS} =-10V, I_D =-7A			173	mΩ
		V_{GS} =-10V, I_D =-9A			210	
		V_{GS} =-4.5V, I_D =-4A			220	
Dynamic characteristics[5]						
Input Capacitance	C_{iss}	V_{DS} =-30V, V_{GS} =0V f =1MHz		444.2		pF
Output Capacitance	C_{oss}			19.6		
Reverse Transfer Capacitance	C_{rss}			17.9		
Total Gate Charge	Q_g	V_{DS} =-30V, V_{GS} =-10V I_D =-9A		11.3		nC
Gate-Source Charge	Q_{gs}			2.7		
Gate-Drain Charge	Q_{gd}			1.6		
Turn-on delay time	$t_{d(on)}$	V_{DS} =-30V, V_{GS} =-10V I_D =-9A, R_G =3Ω		40		nS
Turn-on rise time	t_r			35		
Turn-off delay time	$t_{d(off)}$			15		
Turn-off fall time	t_f			10		
Source-Drain Diode characteristics						
Diode Forward Current[3]	I_S				-9	A
Diode Forward Voltage[4]	V_{SD}	V_{GS} =0V, I_S =-9A			-1.2	V
Reverse Recovery Time	T_{rr}	I_F =-9A, di/dt =-100A/μs[4] T_J=25℃		25		nS
Reverse Recovery Charge	Q_{rr}			31		nC

Notes:

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

2) EAS condition: T_j=25℃, V_{DD}=-30V, V_G=-10V, L =0.5mH, R_G=25Ω.

3) Surface Mounted on FR4 Board, t ≤10 sec.

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

5) Guaranteed by design, not subject to production testing.

Typical Characteristics

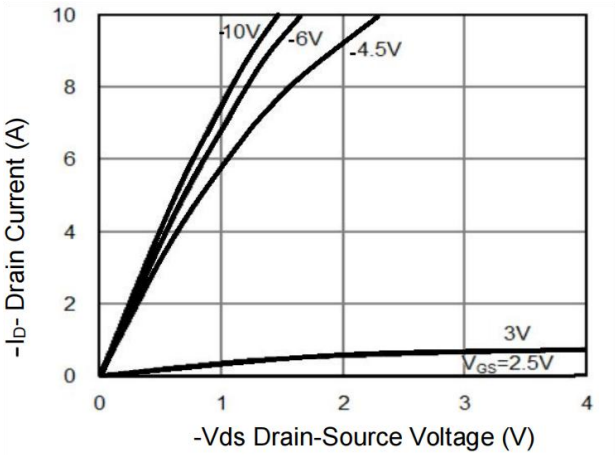


Figure 1 Output Characteristics

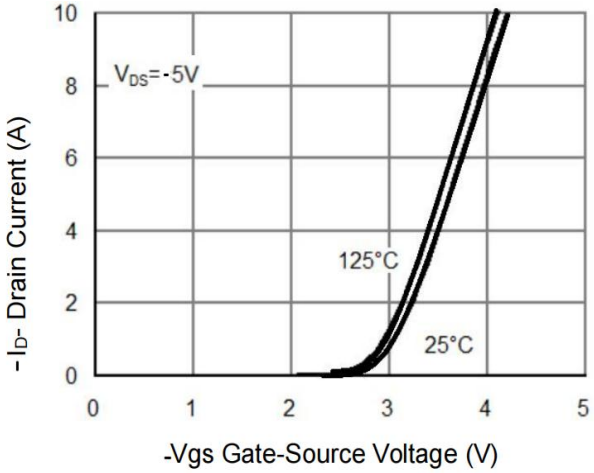


Figure 2 Transfer Characteristics

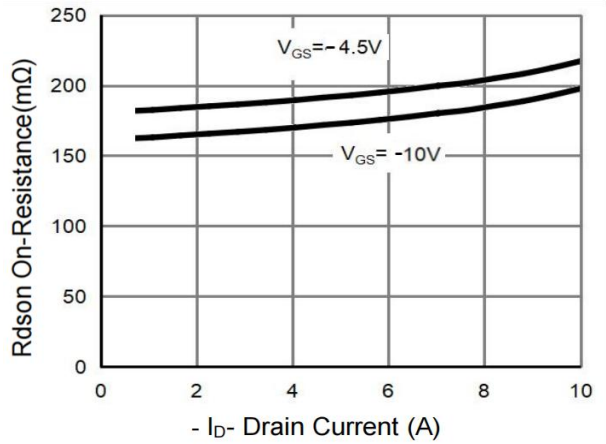


Figure 3 Rdson- Drain Current

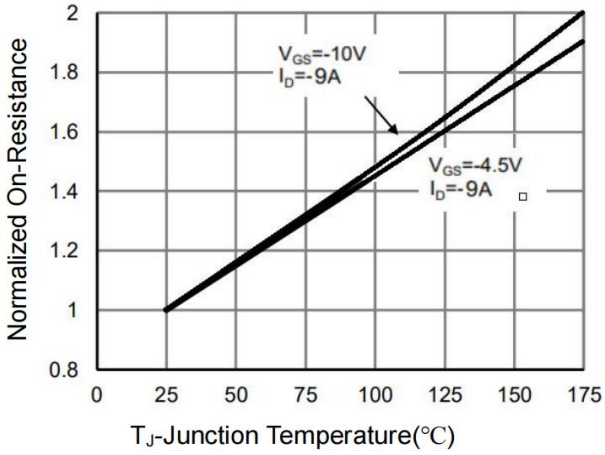


Figure 4 Rdson-Junction Temperature

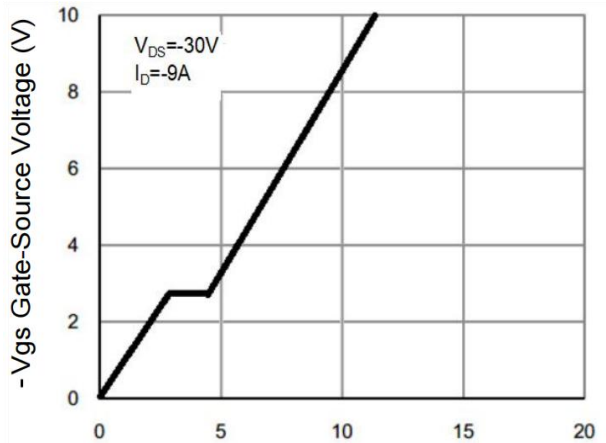


Figure 5 Gate Charge

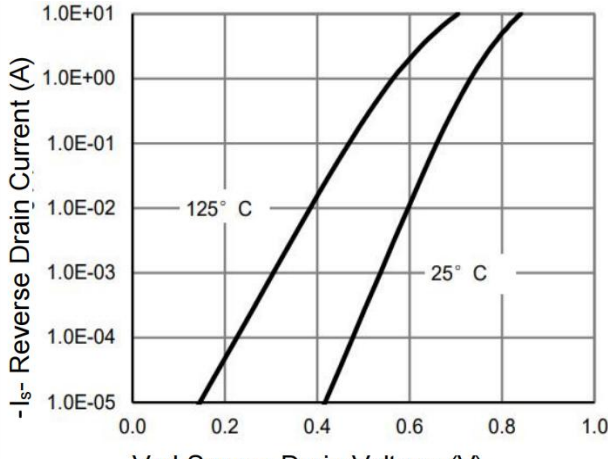


Figure 6 Source- Drain Diode Forward

Typical Characteristics

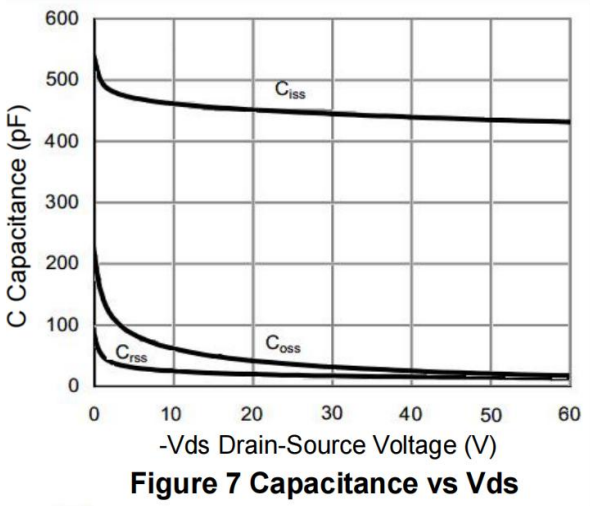


Figure 7 Capacitance vs Vds

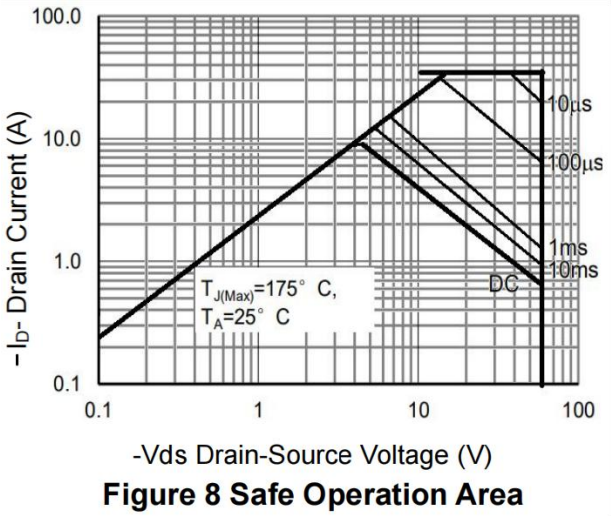


Figure 8 Safe Operation Area

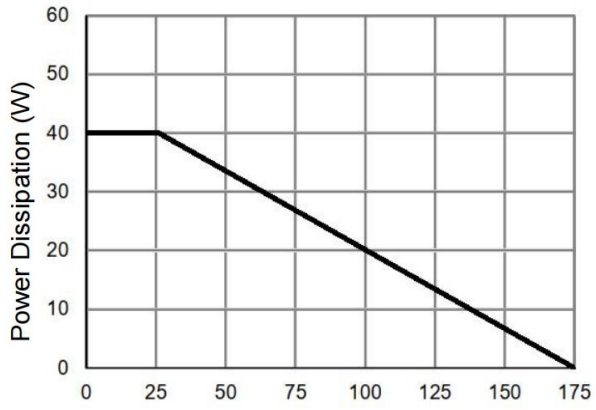


Figure 9 Power De-rating

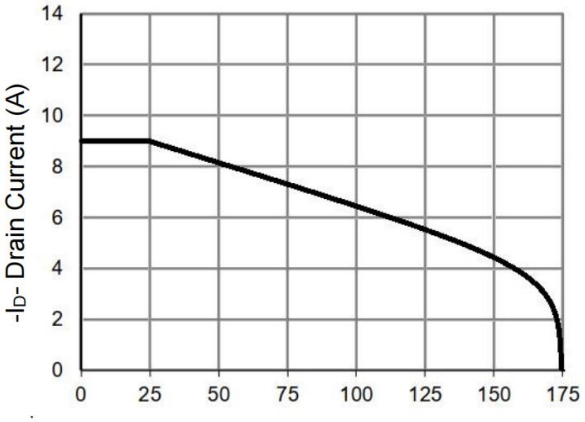


Figure 10 ID Current De-rating

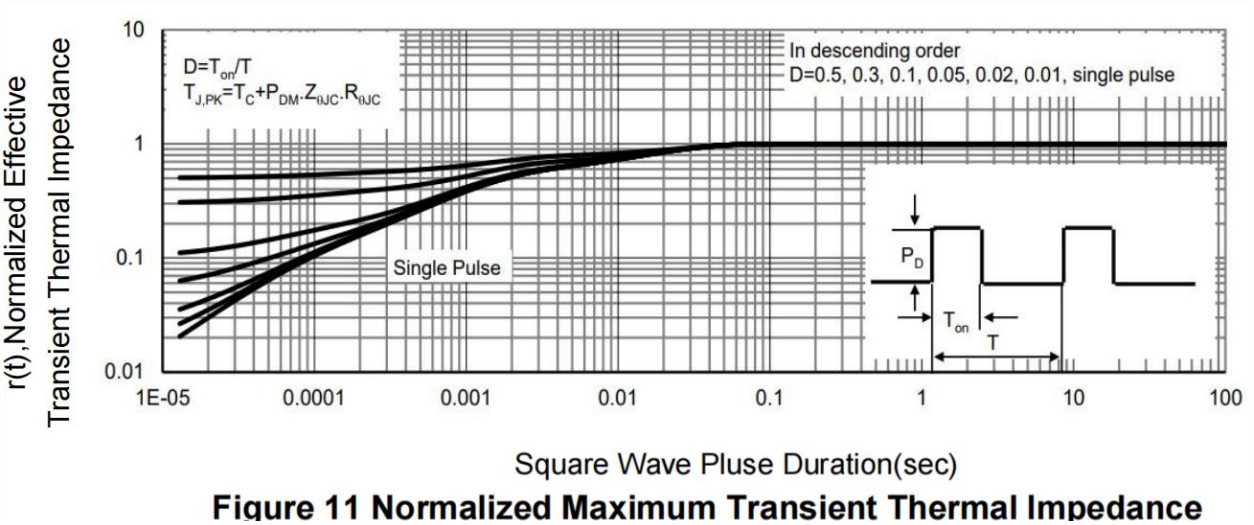
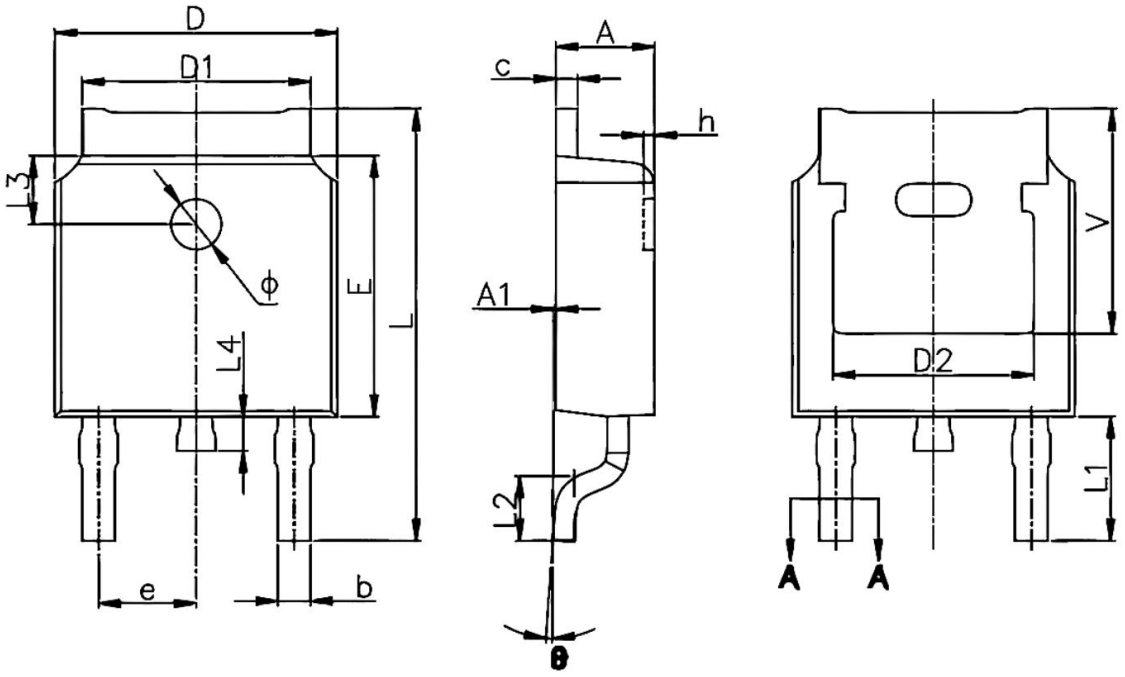


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-252AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.130	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.190	2.390	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 BSC.		0.063 BSC.	
L4	0.600	1.000	0.024	0.039
ϕ	1.100	1.300	0.043	0.051
h	0.000	0.300	0.000	0.012
θ	0°	8°	0°	8°
V	5.350 REF.		0.211 REF.	