AD40P04S-Q1

P-Channel Enhancement Mode Power MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-40V	14mΩ@-10V	-40A
	24mΩ@-4.5V	

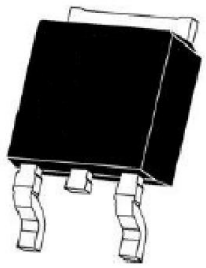
Feature

- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Suffix "-Q1" for AEC-Q101

Application

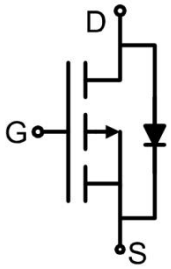
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

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}	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D	-40	A
Continuous Drain Current (T_C=100℃)	I_D (100℃)	-28	A
Pulsed Drain Current	I_{DM}	-160	A
Power Dissipation	P_D	80	W
Thermal Resistance,Junction-to-Ambient	$R_{\theta JA}$	50	℃/W
Thermal Resistance,Junction-to-Case	$R_{\theta JC}$	1.88	℃/W
Single pulse avalanche energy	E_{AS}	544	mJ
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55 ~ +150	℃

Electrical characteristics (T_C=25 °C, 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_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage[1)]	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1.5	-1.9	-2.5	V
Drain-source on-resistance[1)]	$R_{DS(on)}$	V_{GS} =-10V, I_D =-12A		12	14	mΩ
		V_{GS} =-4.5V, I_D =-12A		18.5	24	
Dynamic characteristics[2)]						
Input Capacitance	C_{iss}	V_{DS} =-20V,V_{GS} =0V,f =1MHz		2960		pF
Output Capacitance	C_{oss}			370		
Reverse Transfer Capacitance	C_{rss}			310		
Total Gate Charge	Q_g	V_{DS} =-20V,V_{GS} =-10V, I_D =-12A		42.2		nC
Gate-Source Charge	Q_{gs}			6.9		
Gate-Drain Charge	Q_{gd}			9.7		
Turn-on delay time	$t_{d(on)}$	V_{DD}=-20V,V_{GS}=-10V, I_D =-12A,R_{GEN}=3.0Ω		10		nS
Turn-on rise time	t_r			18		
Turn-off delay time	$t_{d(off)}$			38		
Turn-off fall time	t_f			24		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				-40	A
Diode Forward voltage[1)]	V_{DS}	V_{GS} =0V, I_S=-12A			-1.2	V
Reverse Recovery Time	t_{rr}	TJ = 25°C, IF =-12A di/dt = 100A/μs [1)]		40		nS
Reverse Recovery Charge	Q_{rr}			42		nC

Notes:

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

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

Typical Characteristics

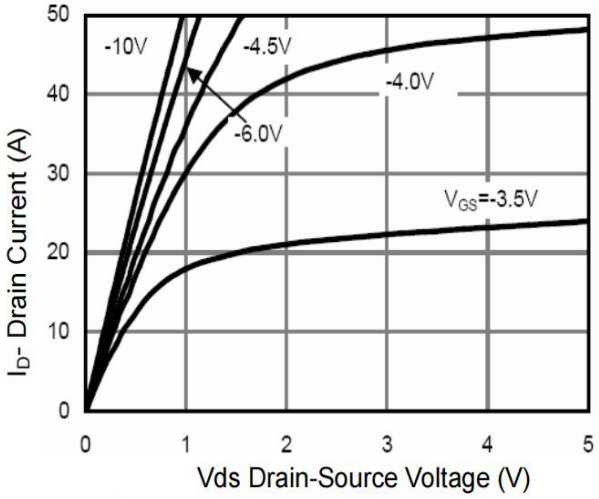

Figure 1 Output Characteristics

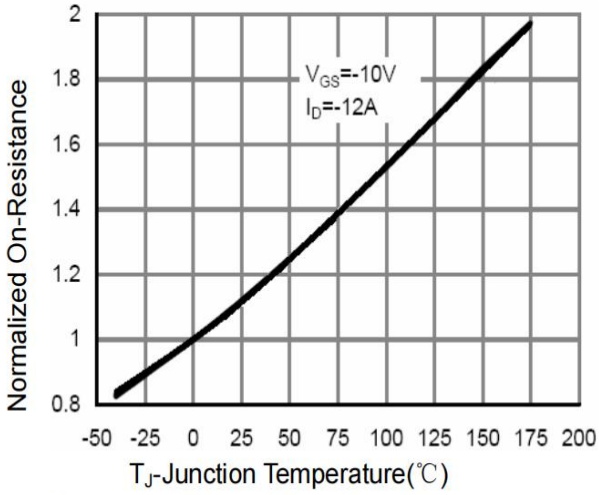

Figure 2 Rdson-Junction Temperature

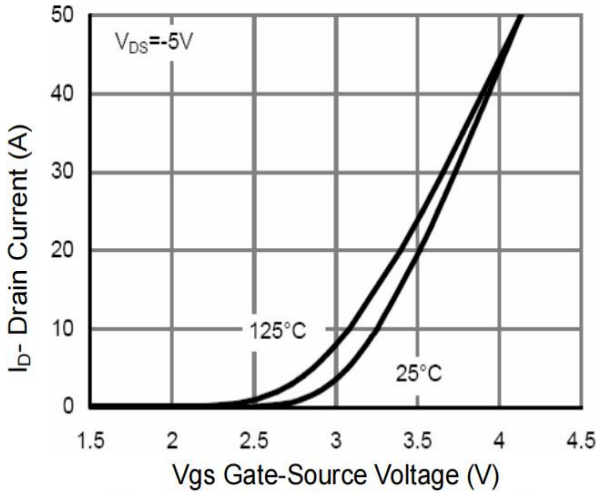

Figure 3 Transfer Characteristics

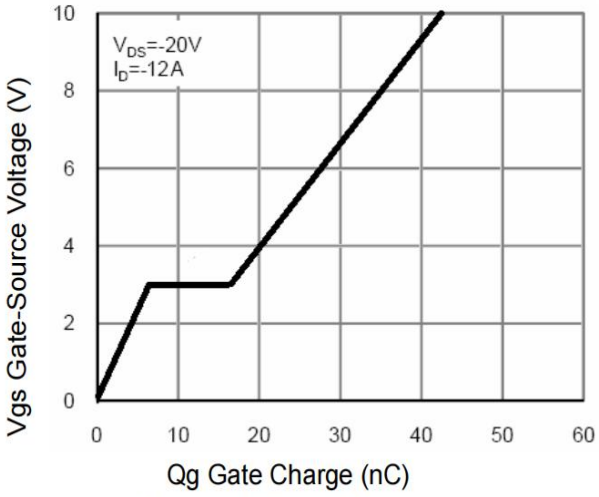

Figure 4 Gate Charge

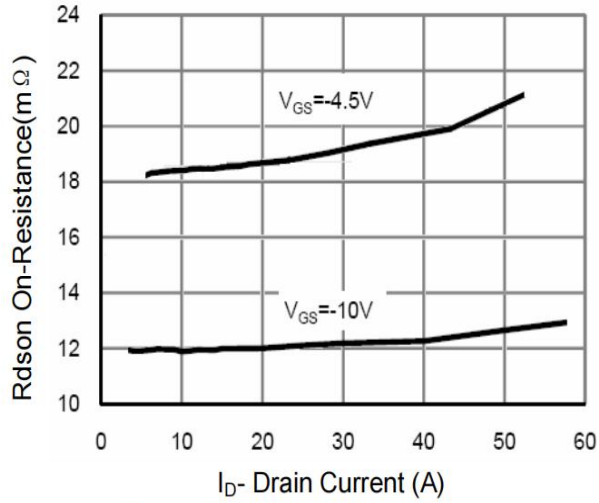

Figure 5 Rdson- Drain Current

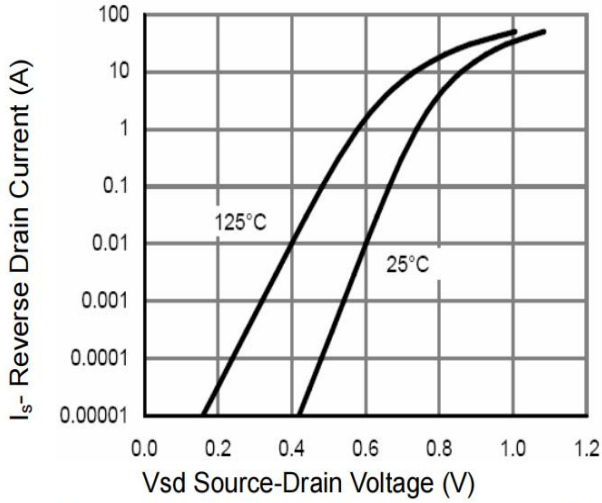

Figure 6 Source- Drain Diode Forward

Typical Characteristics

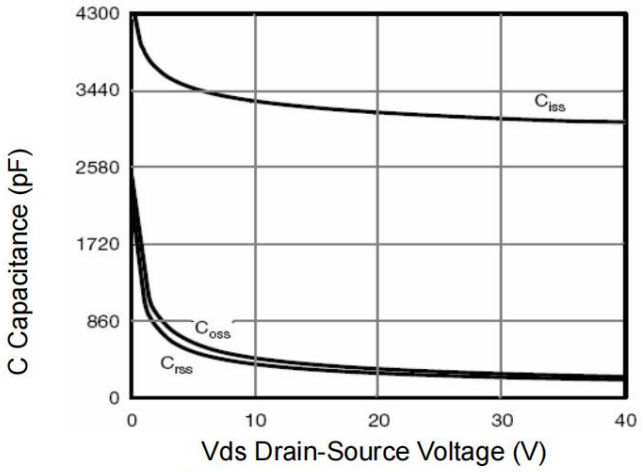

Figure 7 Capacitance vs Vds

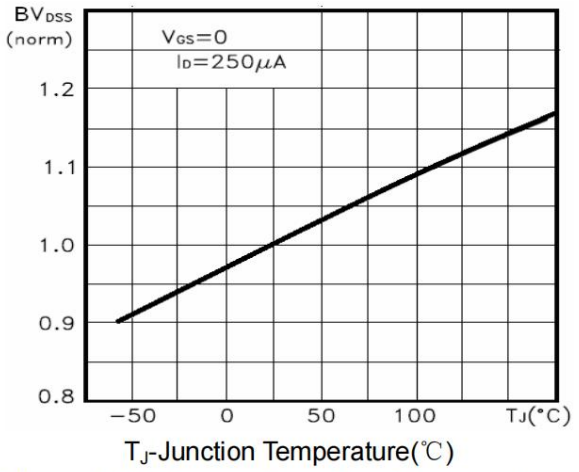

Figure 8 BV_{DSS} vs Junction Temperature

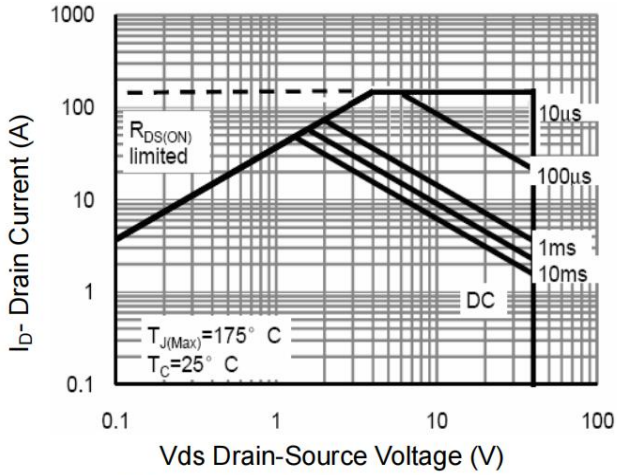

Figure 9 Safe Operation Area

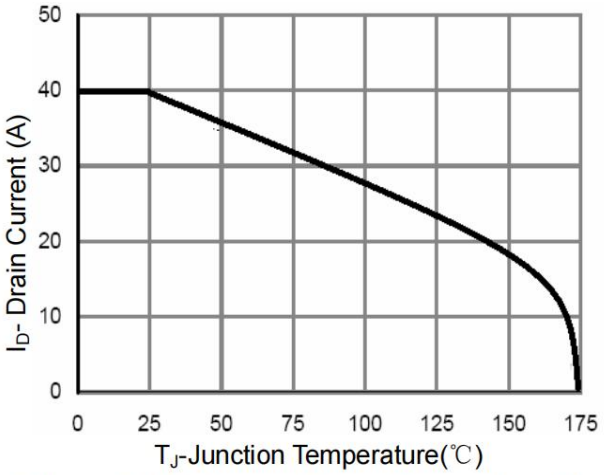

Figure 10 ID Current Derating vs Junction Temperature

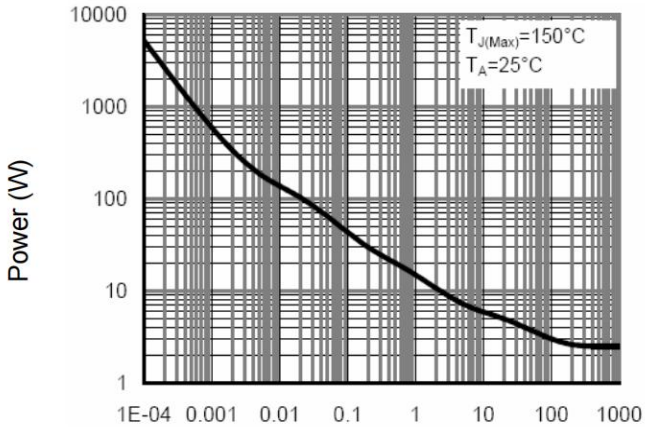

Figure 11 Single Pulse Power Rating Junction-to-Ambient

Typical Characteristics

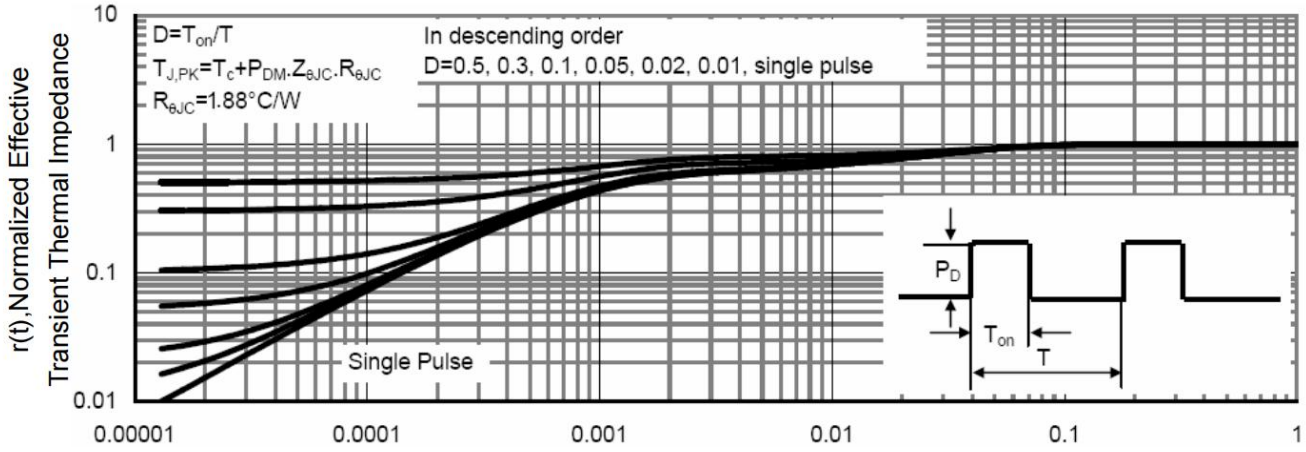

Figure 12 Normalized Maximum Transient Thermal Impedance

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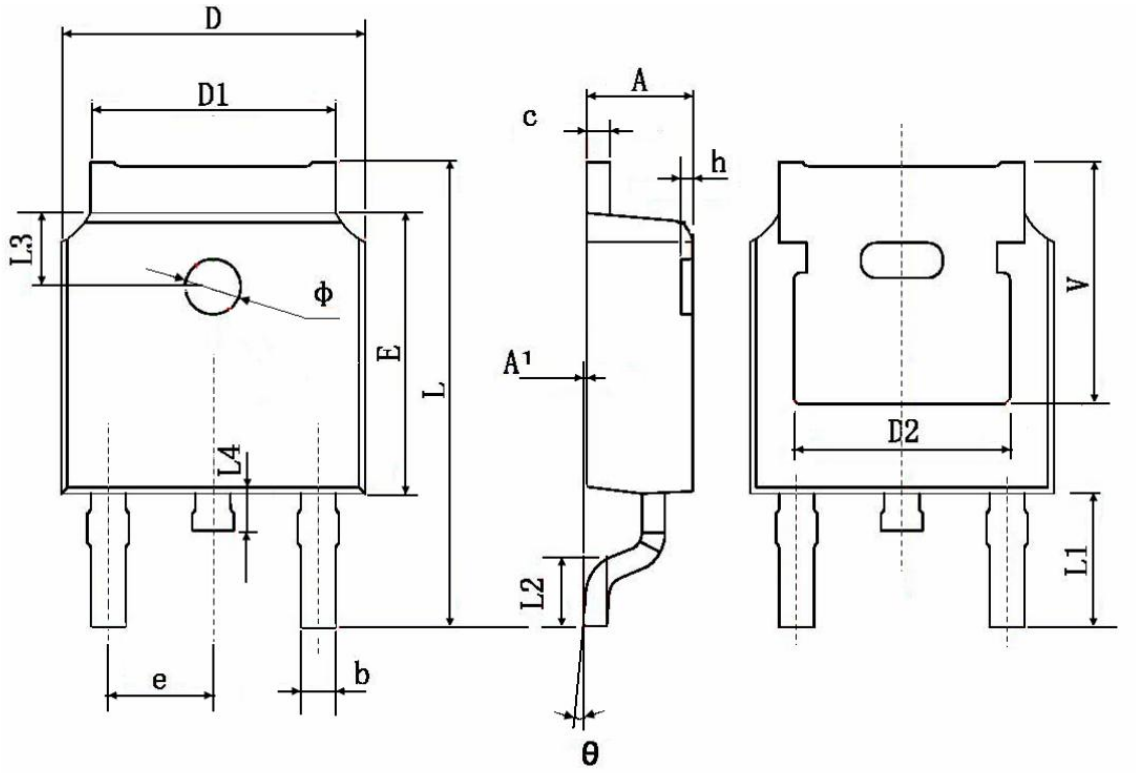
TO-252AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.200	0.000	0.008
b	0.660	0.860	0.026	0.043
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 TYP		0.190 TYP	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF		0.114 REF	
L2	1.250	1.750	0.049	0.069
L3	1.600 TYP		0.063 TYP	
L4	0.600	1.000	0.024	0.039
θ	0°	10°	0°	10°
Φ	1.100	1.300	0.043	0.051
h	0.000	0.300	0.000	0.012
v	5.350 TYP		0.211 TYP	