ANBONSEMI
INNOVATOR IN SEMICONDUCTOR

AT047SP040MTA-Q1

P-Channel Enhancement Mode Power MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-40V	12mΩ@-10V	-47A
	22mΩ@-4.5V	

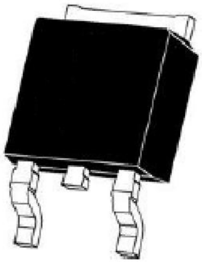
Feature

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

Application

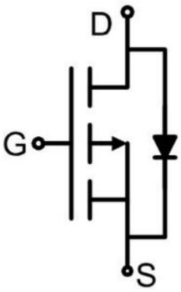
- Power management
- Portable equipment

Package

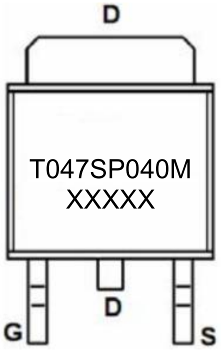


TO-252AB

Circuit diagram



Marking



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 1,2) (V_{GS}=-10V)	I_D	-47	A
Continuous Drain Current 1,2) (V_{GS}=-10V,T_C=100℃)	I_D (100℃)	-29	A
Pulsed Drain Current (t_p≤10μs)	I_{DM}	-188	A
Power Dissipation 1,2)	P_D	44	W
Thermal Resistance,Junction-to-Case	$R_{θJC}$	2.8	℃/W
Single pulse avalanche energy3)	E_{AS}	89.3	mJ
Junction Temperature	T_J	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_{GS} =±20V, V_{DS} = 0V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1.2	-1.7	-2.2	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =-10V, I_D =-20A		9.5	12	mΩ
		V_{GS} =-4.5V,I_D =-20A		16.5	22	
Dynamic characteristics4)						
Input Capacitance	C_{iss}	V_{DS} =-20V,V_{GS} =0V, f=1MHz		2595		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=-20A		55.6		nC
Gate-Source Charge	Q_{gs}			10.5		
Gate-Drain Charge	Q_{gd}			8.6		
Turn-on delay time	$t_{d(on)}$	V_{DS}=-20V,V_{GS}=-10V, I_D =-20A,R_{GEN}=3Ω		10		nS
Turn-on rise time	t_r			13		
Turn-off delay time	$t_{d(off)}$			72		
Turn-off fall time	t_f			43		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				-47	A
Diode Forward voltage	V_{SD}	V_{GS} =0V,I_S=-20A			-1.2	V
Reverse Recovery Time	t_{rr}	I_F=-20A, di/dt= 100A/μs V_{GS} =0V,V_R =-20V		24		nS
Reverse Recovery Charge	Q_{rr}			21.3		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) Thermal resistance from junction to soldering point (on the exposed drain pad).

3) T_J=25℃,V_G=-10V, R_G=25Ω, L=0.5mH, I_{AS}=-18.9A.

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

Typical Characteristics

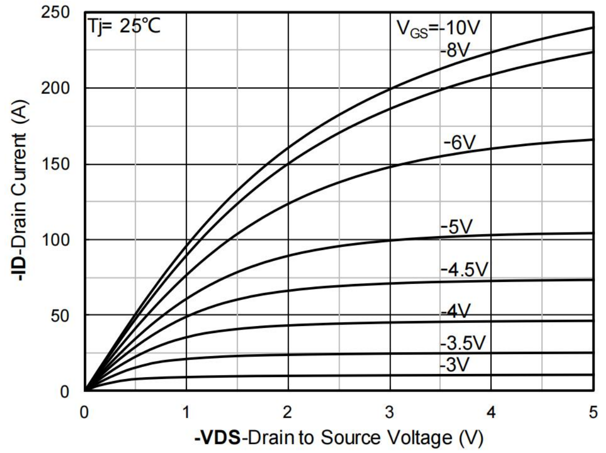


Figure 1. Output Characteristics; typical values

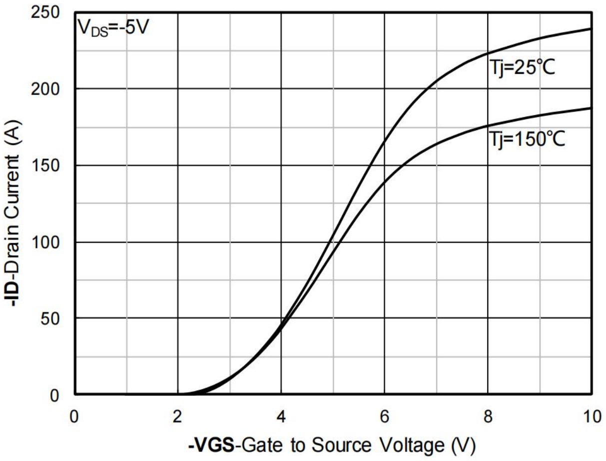


Figure 2. Transfer Characteristics; typical values

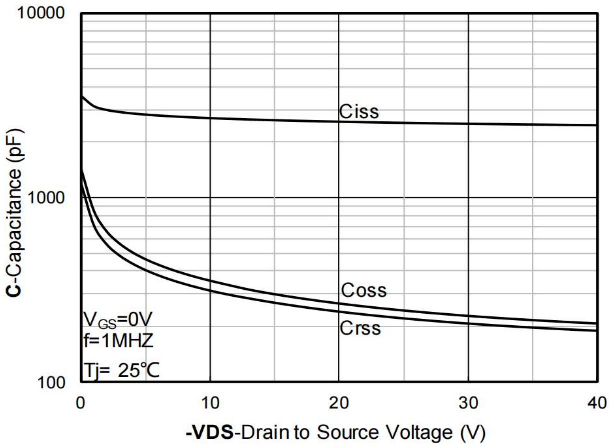


Figure 3. Capacitance Characteristics; typical values

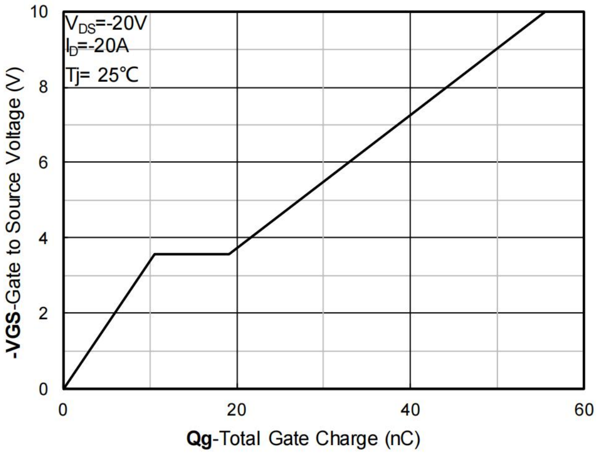


Figure 4. Gate Charge; typical values

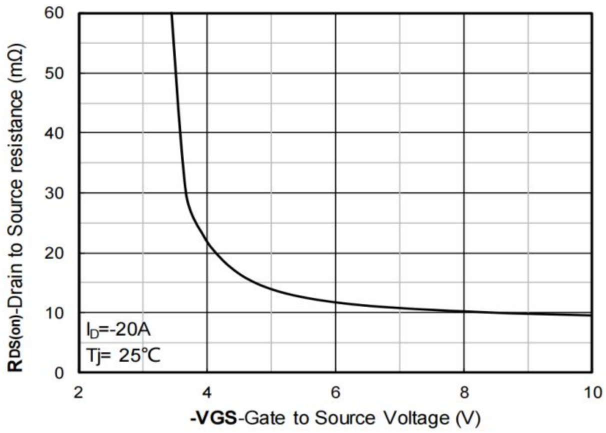


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

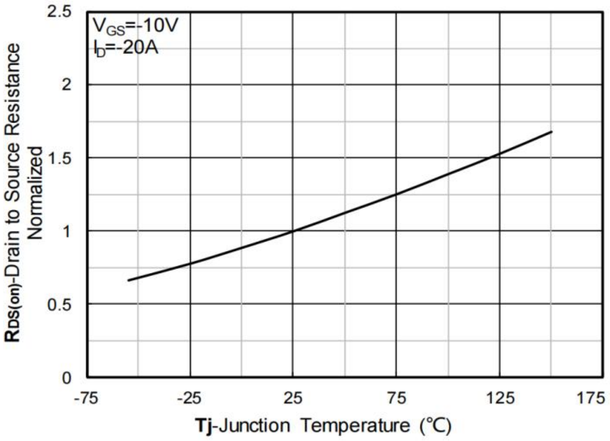


Figure 6. Normalized On-Resistance

Typical Characteristics

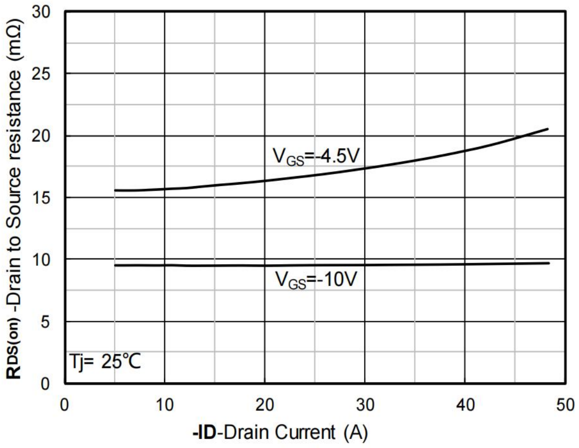


Figure 7. RDS(on) vs. Drain Current; typical values

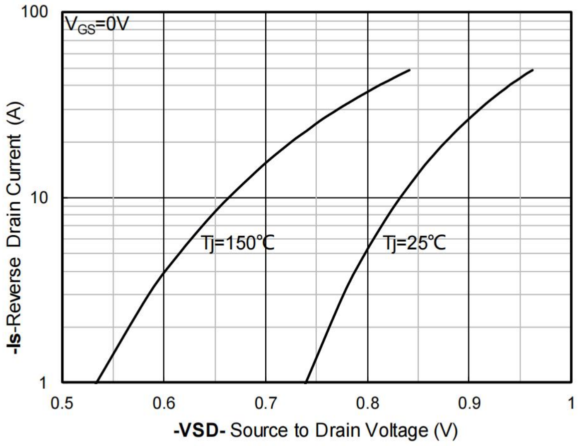


Figure 8. Forward characteristics of reverse diode; typical values

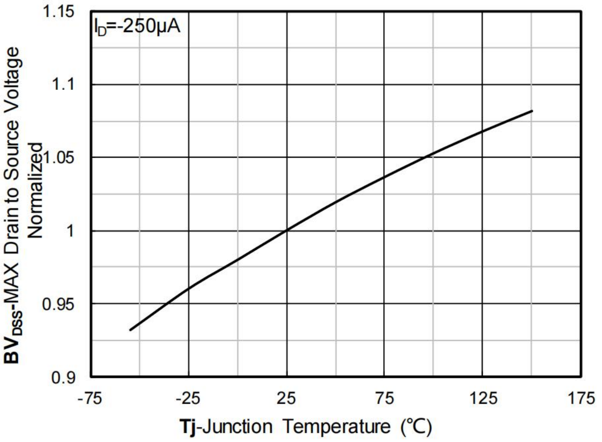


Figure 9. Normalized breakdown voltage

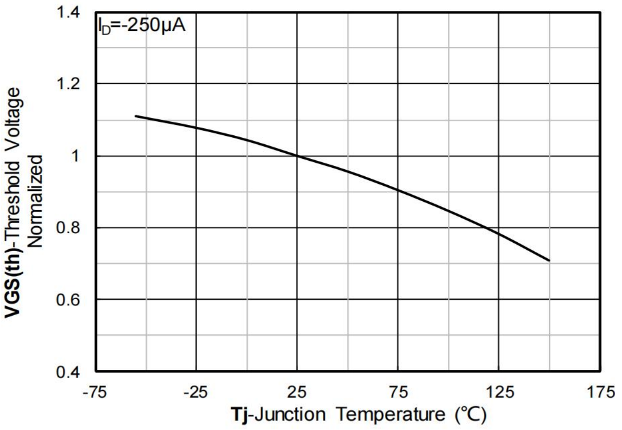


Figure 10. Normalized Threshold voltage

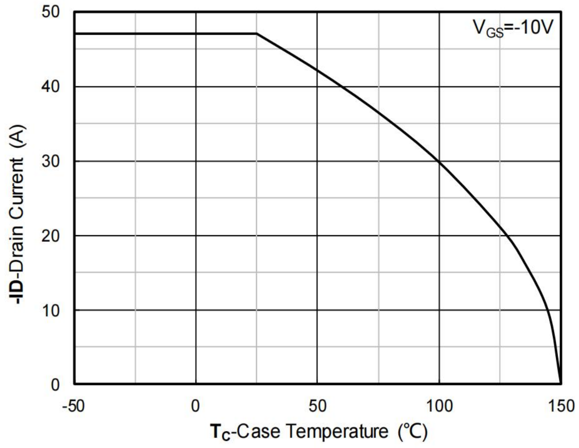


Figure 11. Current dissipation

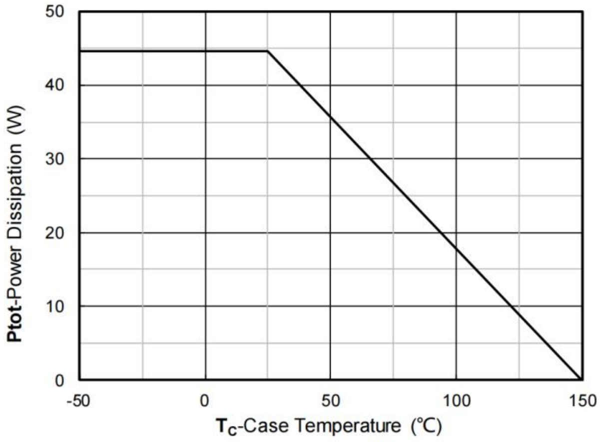


Figure 12. Power dissipation

Typical Characteristics

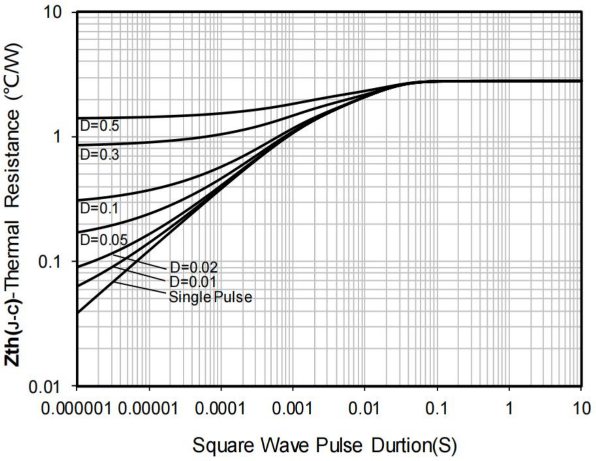


Figure 13. Maximum Transient Thermal Impedance

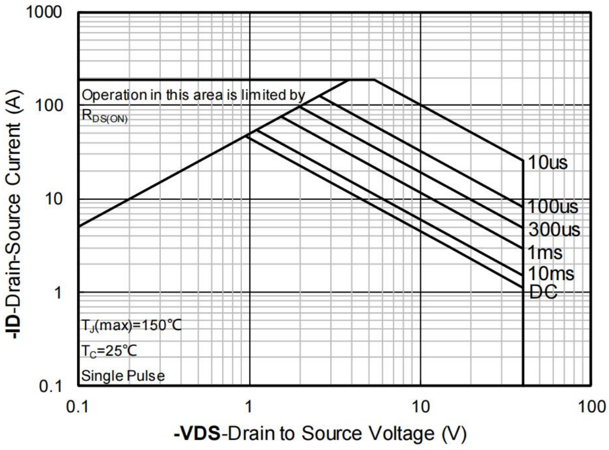
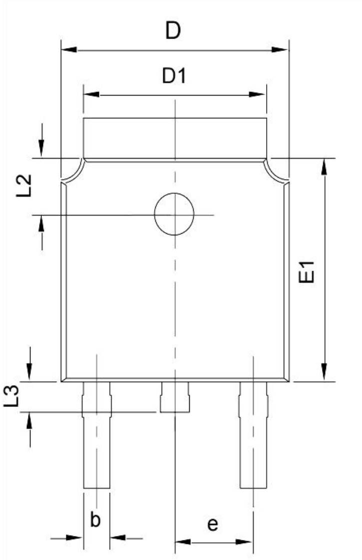
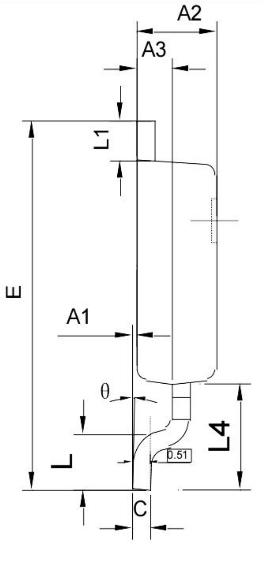


Figure 14. Safe Operation Area

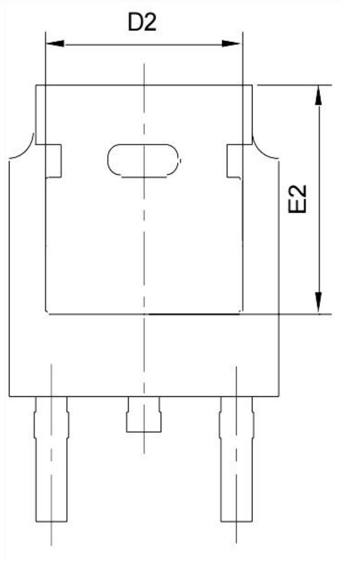
TO-252AB Package Information



TOP VIEW



SIDE VIEW



BOTTOM VIEW

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A1	0.000	0.200	0.000	0.008
A2	2.200	2.400	0.087	0.094
A3	0.900	1.100	0.035	0.043
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	5.150	5.450	0.203	0.215
D2	4.600	4.950	0.181	0.195
E	9.900	10.300	0.390	0.406
E1	6.000	6.200	0.236	0.244
E2	5.150	5.450	0.203	0.215
e	2.286 BSC.		0.090 BSC.	
L	1.250	1.750	0.049	0.069
L1	0.900	1.270	0.035	0.050
L2	1.400	1.900	0.055	0.075
L3	0.600	1.000	0.024	0.039
L4	2.900 REF.		0.114 REF.	
θ	0°	10°	0°	10°