

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
-60V	24mΩ@-10V	-37A

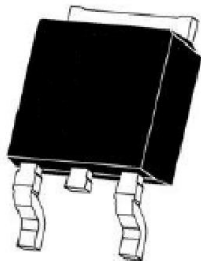
## Feature

- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(on)}$
- Suffix "-Q1" for AEC-Q101

## Application

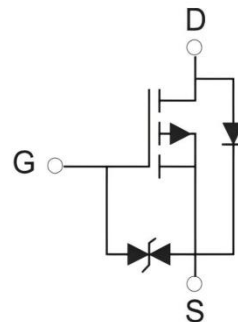
- Reverse polarity protection
- Load switch
- EES

## Package

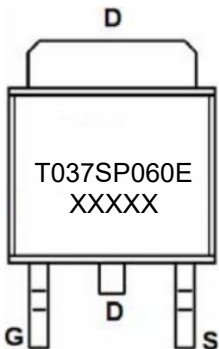


TO-252AB

## Circuit diagram



## Marking



### Absolute maximum ratings (T<sub>C</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	-60	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current <sup>1,3)</sup> (V <sub>GS</sub> = -10V, Chip limitation)	I <sub>D</sub>	-37	A
Continuous Drain Current <sup>1,3)</sup> (V <sub>GS</sub> = -10V, T <sub>C</sub> = 100°C)	I <sub>D</sub> (100°C)	-26	A
Pulsed Drain Current (t <sub>p</sub> ≤ 10us)	I <sub>DM</sub>	-148	A
Single Pulse Avalanche Energy <sup>2)</sup>	E <sub>AS</sub>	110.25	mJ
Power Dissipation <sup>1,3)</sup> (T <sub>C</sub> = 25°C)	P <sub>D</sub>	73	W
Thermal Resistance Junction to Case	R <sub>θJC</sub>	2.05	°C/W
Operating Junction Temperature	T <sub>J</sub>	-55 ~ +175	°C
Storage Temperature	T <sub>STG</sub>	-55 ~ +175	°C

### Electrical characteristics (T<sub>J</sub>=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-60			V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = -60V, V <sub>GS</sub> = 0V			-1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V			±10	μA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.2	-2	-2.8	V
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -20A		19	24	mΩ
<b>Dynamic characteristics<sup>4)</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -30V, V <sub>GS</sub> = 0V, f = 1MHz		3040		pF
Output Capacitance	C <sub>oss</sub>			184		
Reverse Transfer Capacitance	C <sub>rss</sub>			170		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -30V, V <sub>GS</sub> = -10V I <sub>D</sub> = -20A		64		nC
Gate-Source Charge	Q <sub>gs</sub>			12.7		
Gate-Drain Charge	Q <sub>gd</sub>			12.2		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DS</sub> = -30V, V <sub>GS</sub> = -10V I <sub>D</sub> = -20A, R <sub>G</sub> = 3Ω		11		nS
Turn-on rise time	t <sub>r</sub>			37		
Turn-off delay time	t <sub>d(off)</sub>			97		
Turn-off fall time	t <sub>f</sub>			52		
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	I <sub>S</sub>	T <sub>C</sub> = 25°C			-37	A
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> = 0V, I <sub>S</sub> = -20A			-1.2	V
Reverse Recovery Time	T <sub>rr</sub>	V <sub>GS</sub> = 0V, V <sub>R</sub> = -30V, I <sub>F</sub> = -20A di/dt = -100A/μs		29		nS
Reverse Recovery Charge	Q <sub>rr</sub>			42		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 test condition is T<sub>J</sub> = 25°C, V<sub>G</sub> = -10V, L = 0.5mH, R<sub>G</sub> = 25Ω, I<sub>AS</sub> = -21A.
- 3) Thermal resistance from junction to soldering point (on the exposed drain pad).
- 4) Guaranteed by design, not subject to production.

## Typical Characteristics

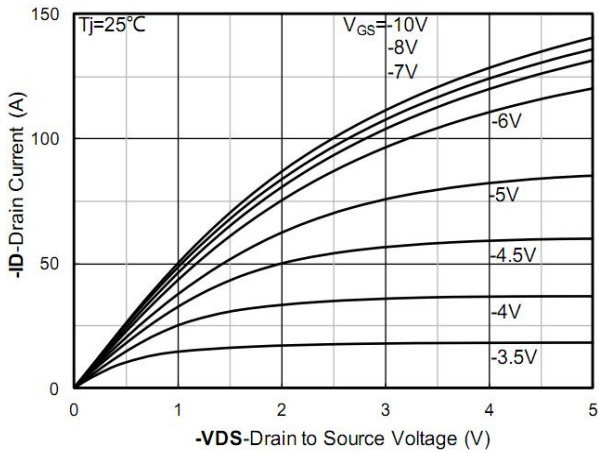


Figure 1. Output Characteristics; typical values

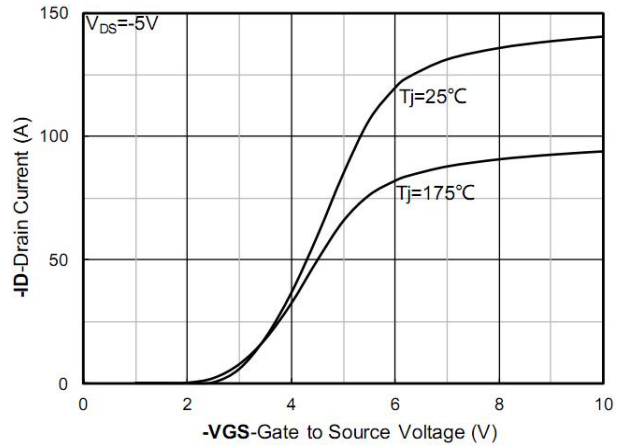


Figure 2. Transfer Characteristics; typical values

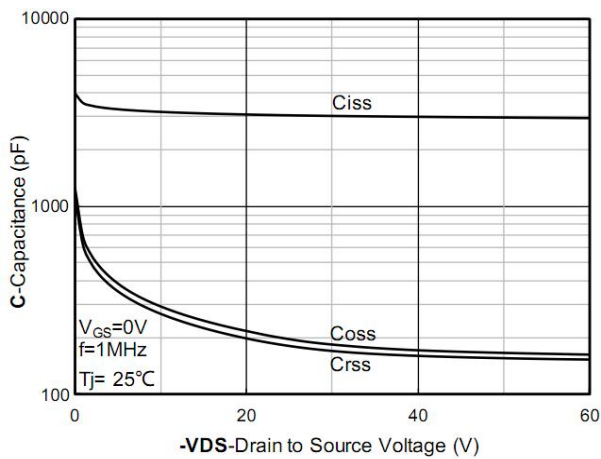


Figure 3. Capacitance Characteristics; typical values

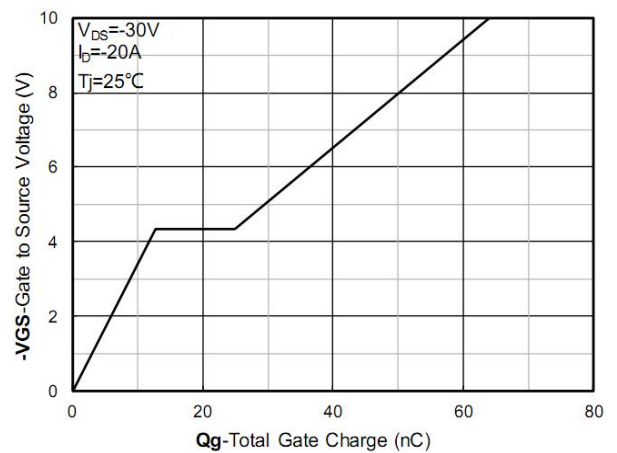


Figure 4. Gate Charge; typical values

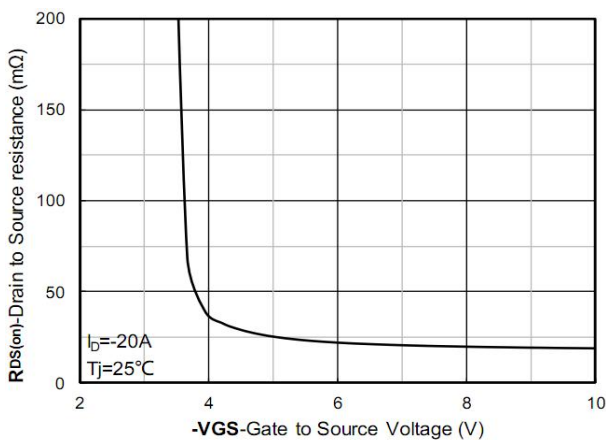


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

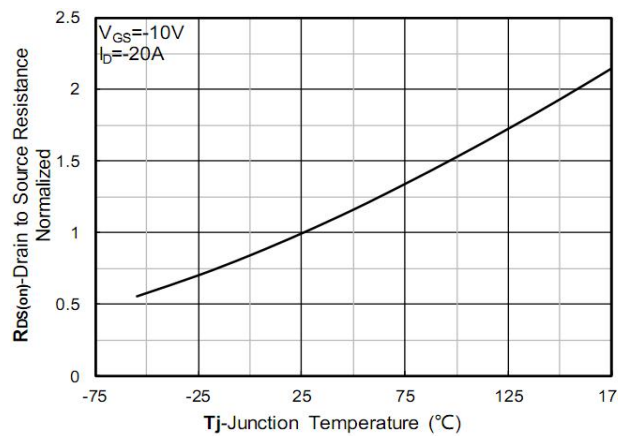


Figure 6. Normalized On-Resistance

## Typical Characteristics

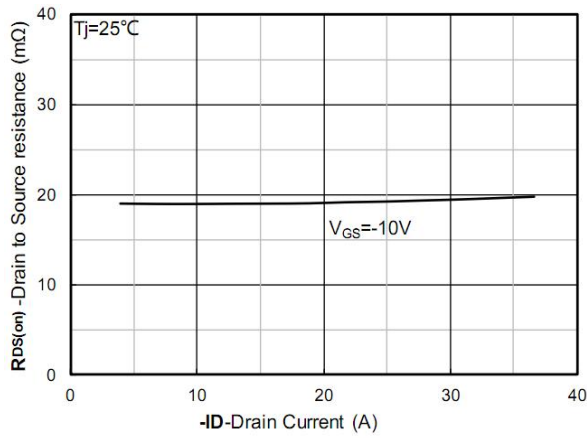


Figure 7.  $R_{DS(on)}$  vs. Drain Current; typical values

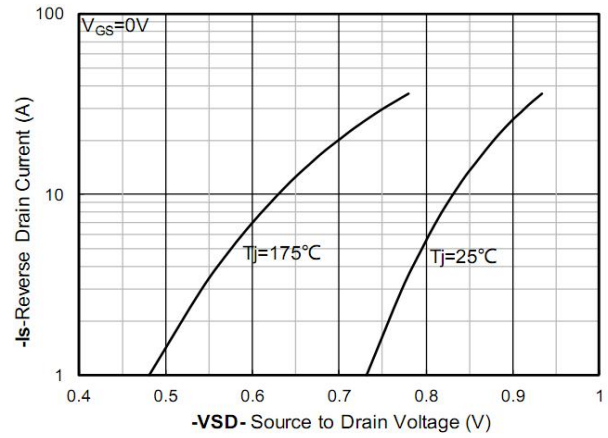


Figure 8. Forward characteristics of reverse diode; typical values

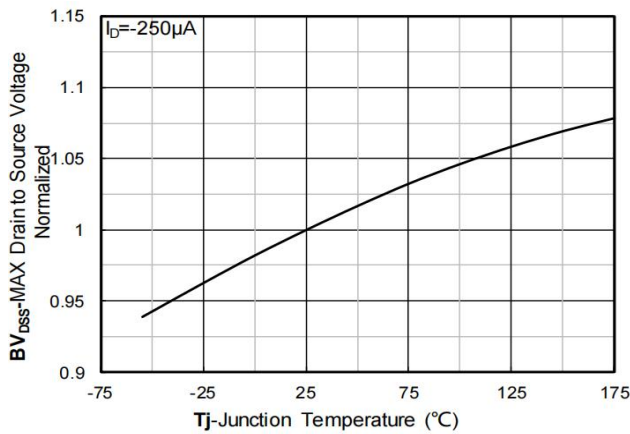


Figure 9. Normalized breakdown voltage

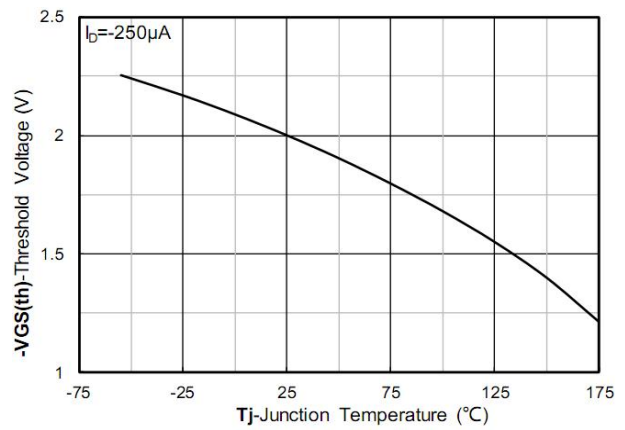


Figure 10. Gate Threshold voltage; typical values

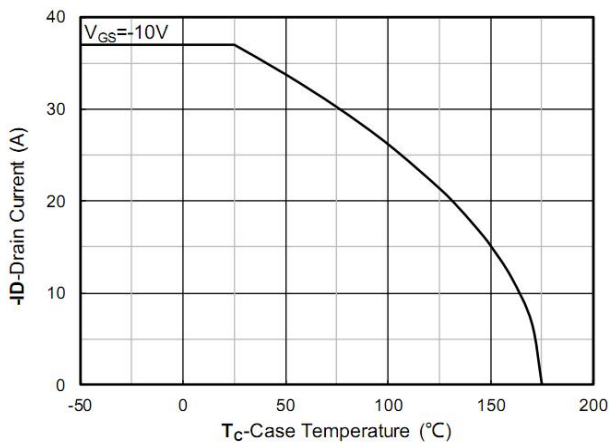


Figure 11. Current dissipation

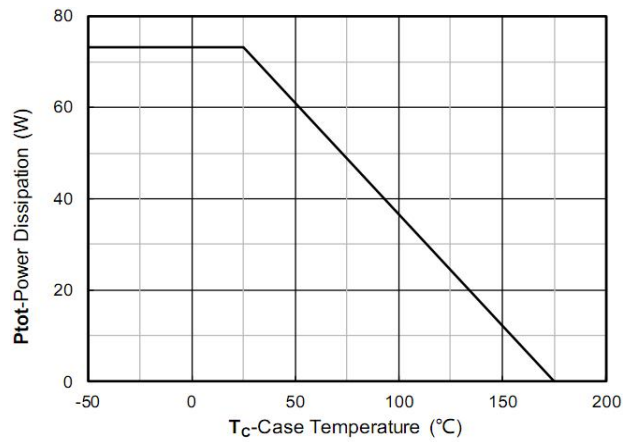


Figure 12. Power dissipation

## Typical Characteristics

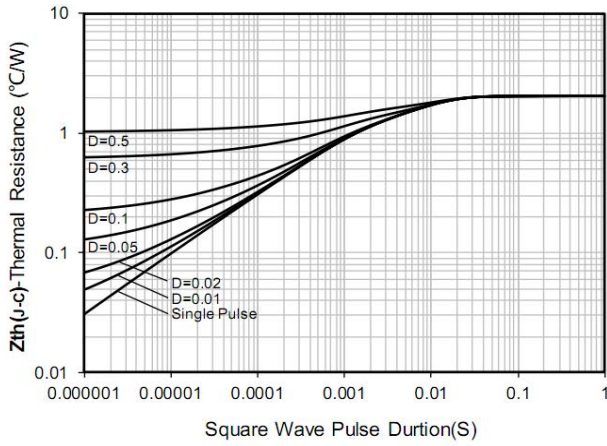


Figure 13. Maximum Transient Thermal Impedance

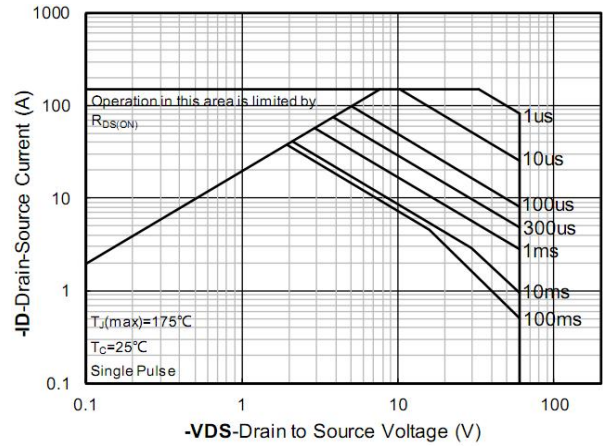
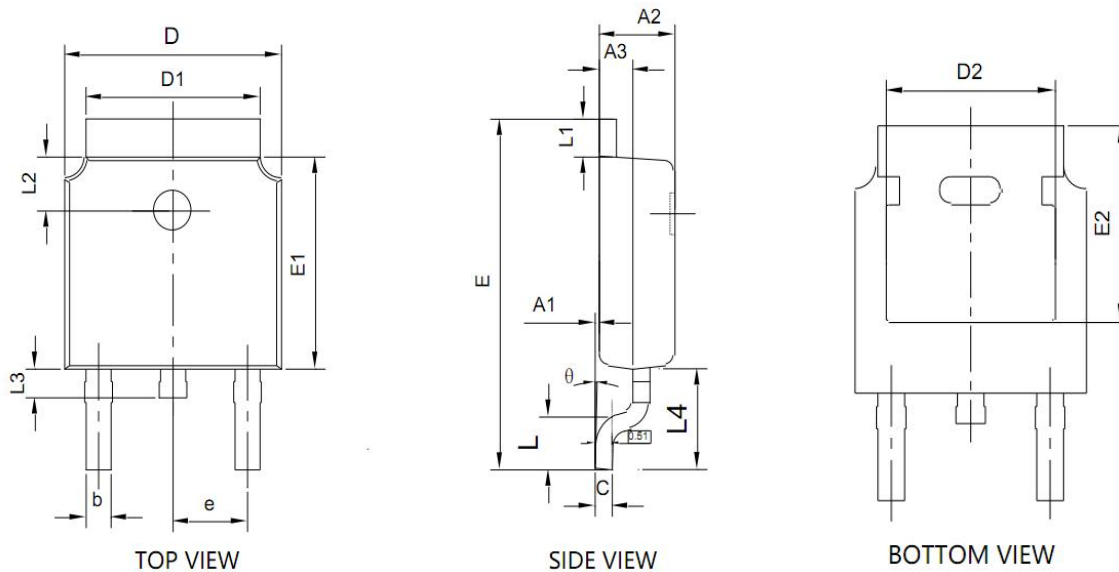


Figure 14. Safe Operation Area

### TO-252AB Package Information



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	0.870	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	
$\theta$	0°	10°	0°	10°