

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
40V	3.5mΩ@10V	150A
	4.8mΩ@4.5V	

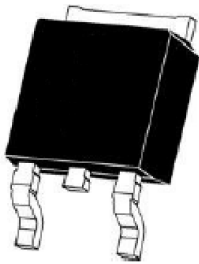
### Feature

- Excellent gate charge x  $R_{DS(on)}$  product(FOM)
- Very low on-resistance  $R_{DS(on)}$
- Suffix“-Q1”for AEC-Q101

### Application

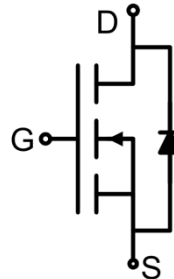
- Automotive application
- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

### Package



TO-252AB

### Circuit diagram



### Marking



### Absolute maximum ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	40	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current(Silicon Limited) <sup>1)</sup>	I <sub>D</sub>	150	A
Continuous Drain Current(Silicon Limited) <sup>1)</sup>	I <sub>D</sub> (100°C)	107	A
Continuous Drain Current(Package Limited)	I <sub>D</sub>	110	A
Pulsed Drain Current	I <sub>DM</sub>	440	A
Power Dissipation	P <sub>D</sub>	150	W
Thermal Resistance,Junction-to-Case	R <sub>θJC</sub>	1	°C/W
Single pulse avalanche energy <sup>2)</sup>	E <sub>AS</sub>	500	mJ
Junction Temperature	T <sub>J</sub>	175	°C
Storage Temperature	T <sub>STG</sub>	-55 ~ +175	°C

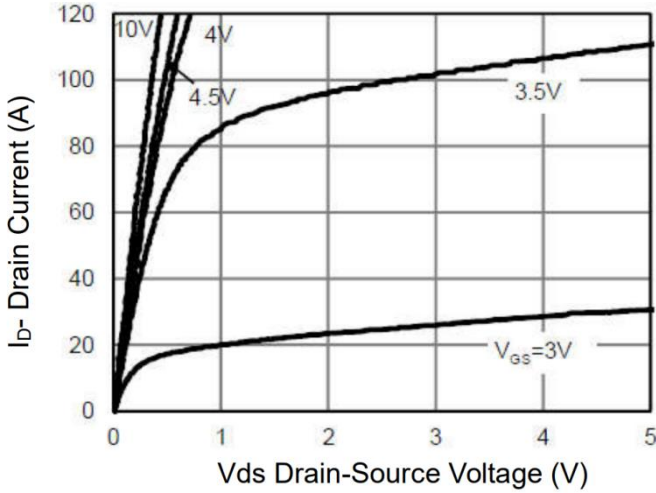
### Electrical characteristics (Tc=25°C unless otherwise noted)<sup>1)</sup>

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	40			V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> = 0V			1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V			±100	nA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1.2	1.7	2.2	V
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		2.4	3.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A		3.3	4.8	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =5V, I <sub>D</sub> =20A		60		S
<b>Dynamic characteristics<sup>1)</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f =1MHz		3510		pF
Output Capacitance	C <sub>oss</sub>			1050		
Reverse Transfer Capacitance	C <sub>rss</sub>			60		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =10V, I <sub>D</sub> =20A		60		nC
Gate-Source Charge	Q <sub>gs</sub>			9.9		
Gate-Drain Charge	Q <sub>gd</sub>			9.5		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =20V, I <sub>D</sub> =20A, V <sub>GS</sub> =10V, R <sub>G</sub> =1.6Ω		10.5		nS
Turn-on rise time	t <sub>r</sub>			4		
Turn-off delay time	t <sub>d(off)</sub>			35		
Turn-off fall time	t <sub>f</sub>			5		
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	I <sub>S</sub>				150	A
Diode Forward voltage	V <sub>DS</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =55A			1.2	V
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> =25°C, I <sub>F</sub> =I <sub>S</sub>		24		nS
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt = 100A/μs		68		nC

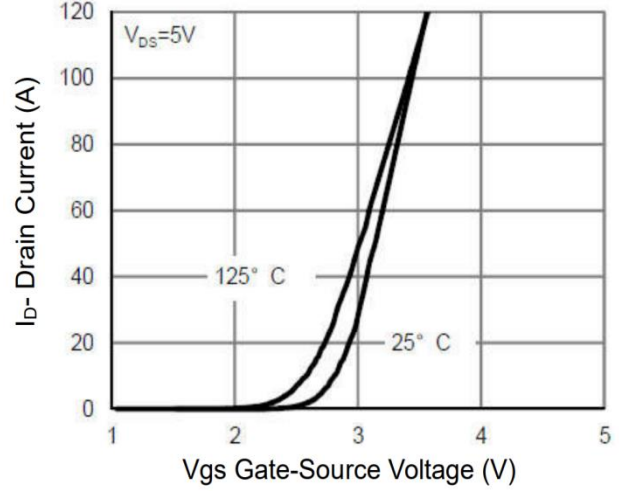
Notes:

- 1) Defined by design. Not Subject to production test.
- 2) EAS condition : T<sub>J</sub> =25°C, V<sub>DD</sub> =20V, V<sub>G</sub> =10V, L=0.5mH, R<sub>g</sub> =25Ω.

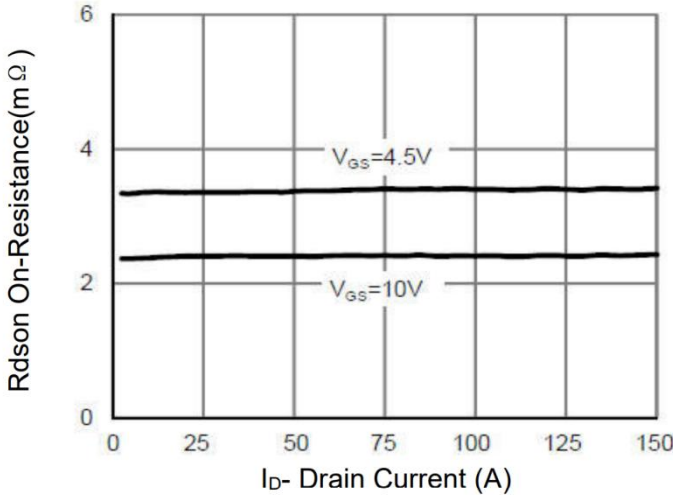
## Typical Characteristics



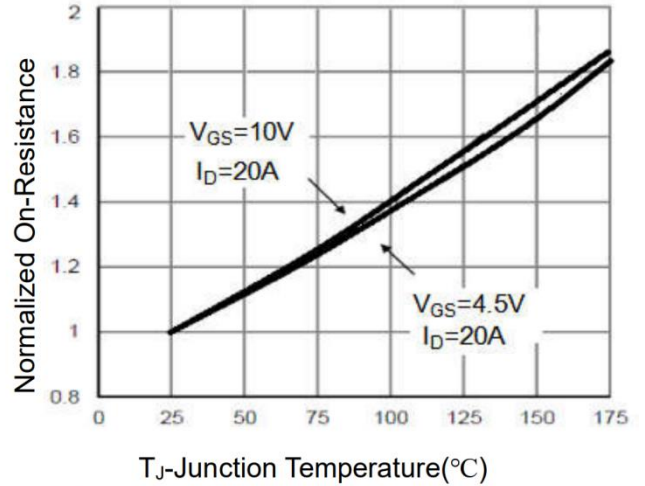
**Figure 1 Output Characteristics**



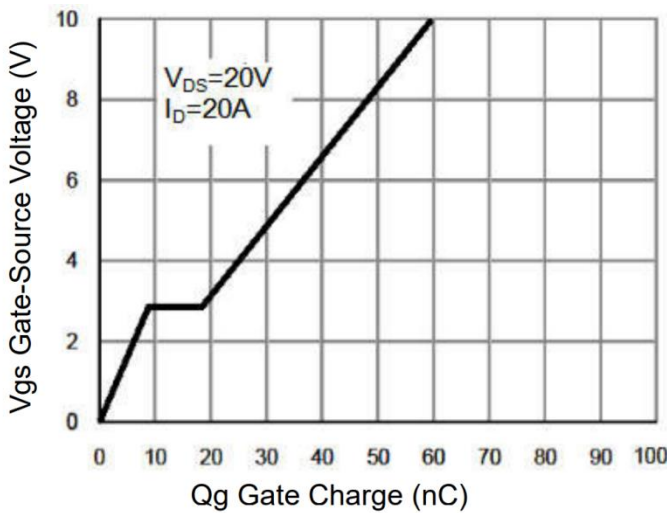
**Figure 2 Transfer Characteristics**



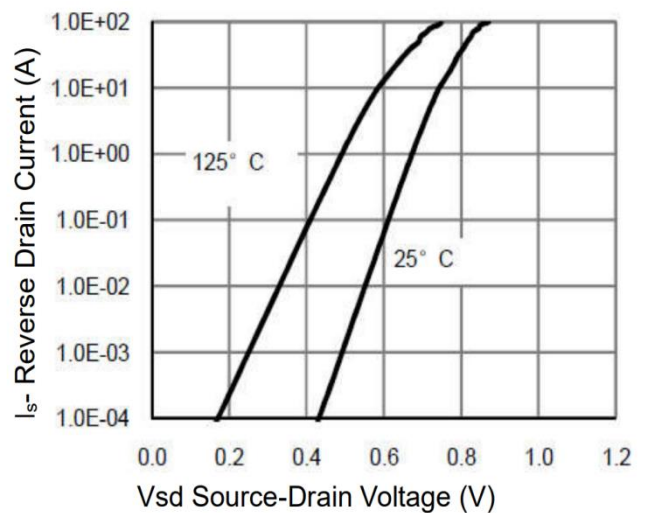
**Figure 3 Rdson- Drain Current**



**Figure 4 Rdson-Junction Temperature**

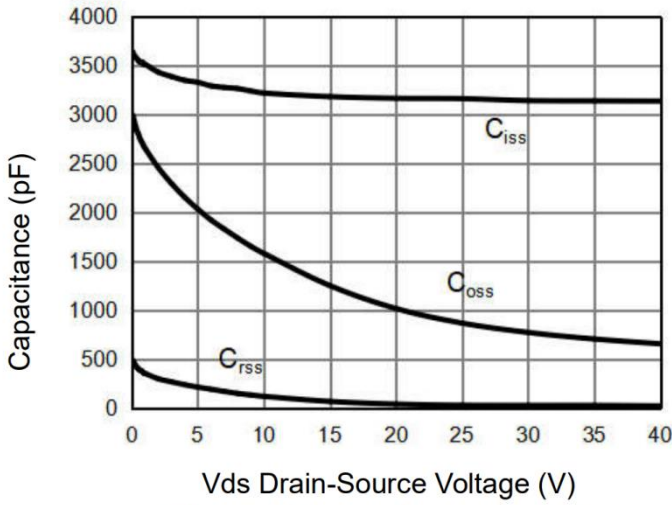


**Figure 5 Gate Charge**

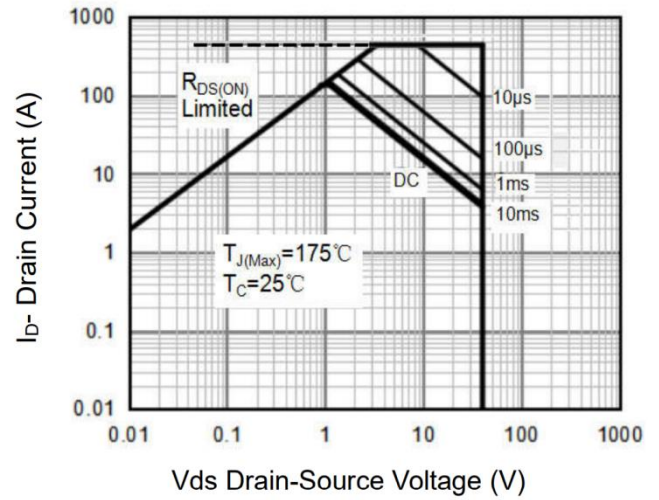


**Figure 6 Source- Drain Diode Forward**

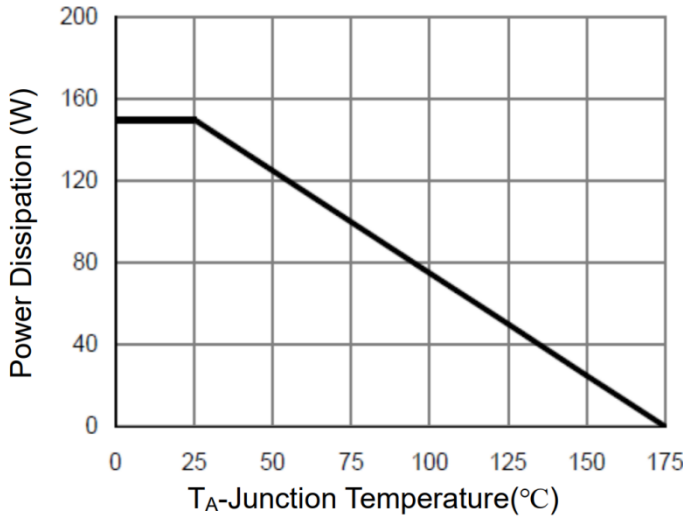
## Typical Characteristics



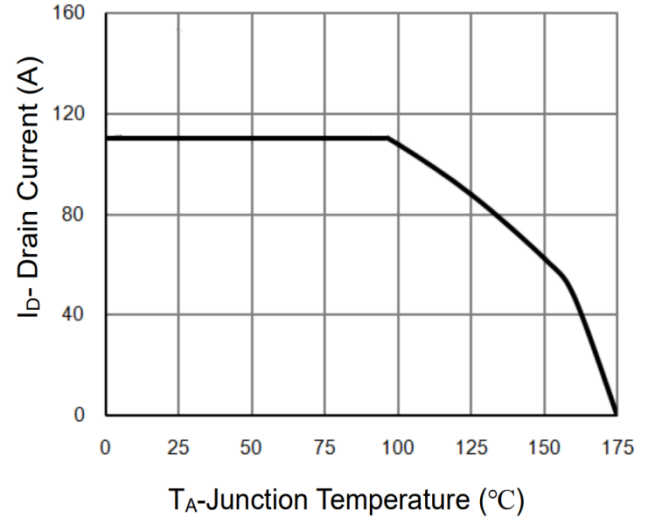
**Figure 7 Capacitance vs Vds**



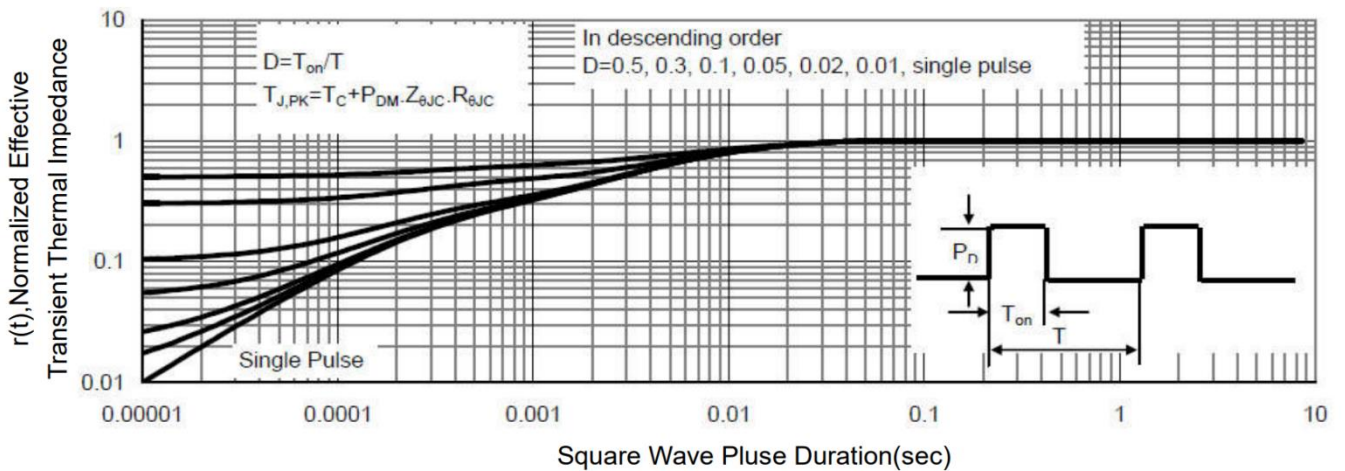
**Figure 8 Safe Operation Area**



**Figure 9 Power De-rating**

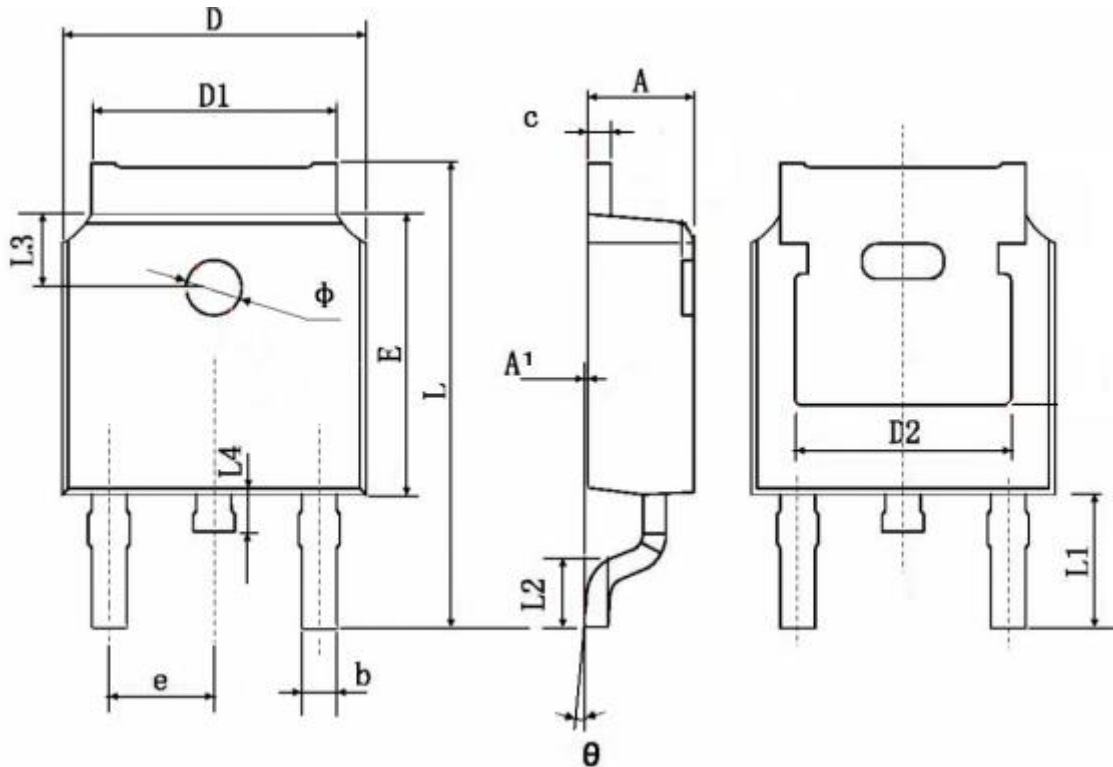


**Figure 10 Current De-rating**



**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	0.086	0.094
A1	0.000	0.130	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.600	0.018	0.024
D	6.500	6.700	0.256	0.264
D1	5.100	5.500	0.201	0.217
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	10.500	0.386	0.413
L1	2.900 REF		0.114 REF	
L2	1.400	1.800	0.055	0.070
L3	1.800 REF		0.071 REF	
L4	0.600	1.000	0.023	0.039
$\phi$	1.100	1.300	0.043	0.051
$\theta$	0°	8°	0°	8°