

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
60V	43mΩ@10V	20A

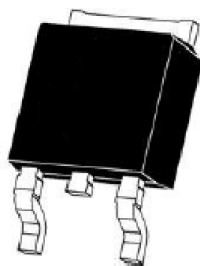
### Feature

- 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

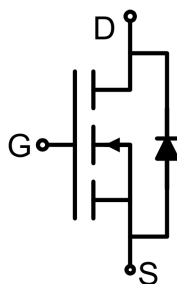
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

### Package

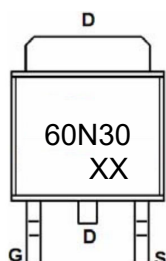


TO-252AB

### Circuit diagram



### Marking



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	20	A
Pulsed Drain Current	$I_{DM}$	60	A
Power Dissipation	$P_D$	40	W
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	3.7	$^{\circ}C/W$
Single pulse avalanche energy	$E_{AS}$	72	mJ
Junction Temperature	$T_J$	150	$^{\circ}C$
Storage Temperature	$T_{STG}$	-55 ~ +150	$^{\circ}C$

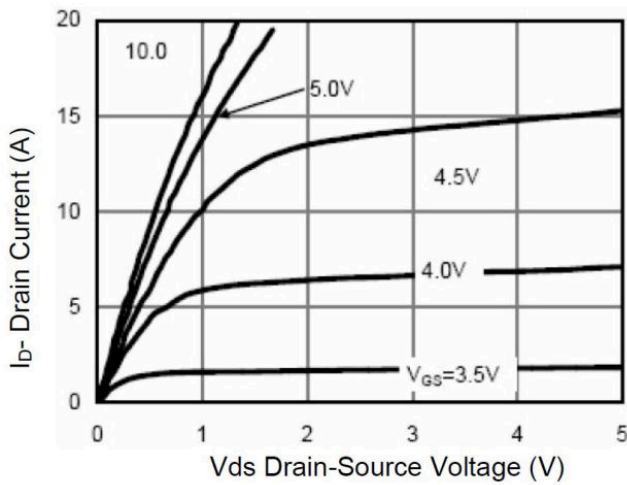
### Electrical characteristics (Ta=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
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>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	1.0	1.6	2.5	V
Drain-source on-resistance <sup>1)</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A		30	43	mΩ
Dynamic characteristics <sup>2)</sup>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =30V,V <sub>GS</sub> =0V,f =1MHz		590		pF
Output Capacitance	C <sub>oss</sub>			60		
Reverse Transfer Capacitance	C <sub>rss</sub>			25		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =30V,V <sub>GS</sub> =10V,I <sub>D</sub> =4.5A		14		nC
Gate-Source Charge	Q <sub>gs</sub>			2.9		
Gate-Drain Charge	Q <sub>gd</sub>			5.2		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> =30V,V <sub>GS</sub> =10V, I <sub>D</sub> =2A,R <sub>GEN</sub> =3Ω,R <sub>L</sub> =6.7Ω		5		nS
Turn-on rise time	t <sub>r</sub>			2.6		
Turn-off delay time	t <sub>d(off)</sub>			16.1		
Turn-off fall time	t <sub>f</sub>			2.3		
Source-Drain Diode characteristics						
Diode Forward Current <sup>1)</sup>	I <sub>S</sub>				20	A
Diode Forward voltage	V <sub>DS</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =20A			1.2	V
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> =20A di/dt = 100A/μs <sup>1)</sup>		35		nS
Reverse Recovery Charge	Q <sub>rr</sub>			53		nC

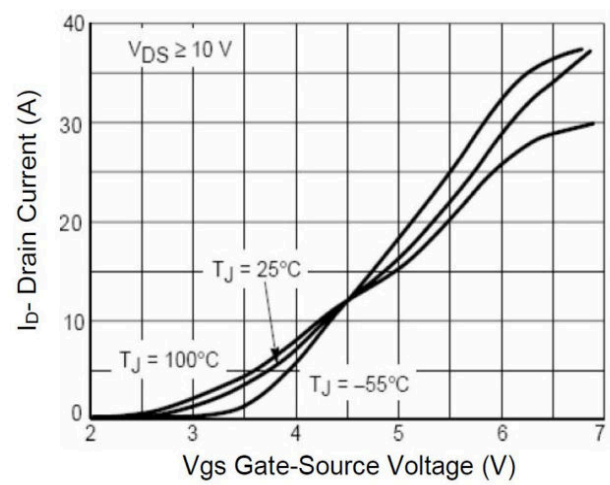
Notes:

- 1) Pulse Test: Pulse Width < 300 $\mu s$ , Duty Cycle  $\leq 2\%$ .  
 2) Guaranteed by design, not subject to production testing.

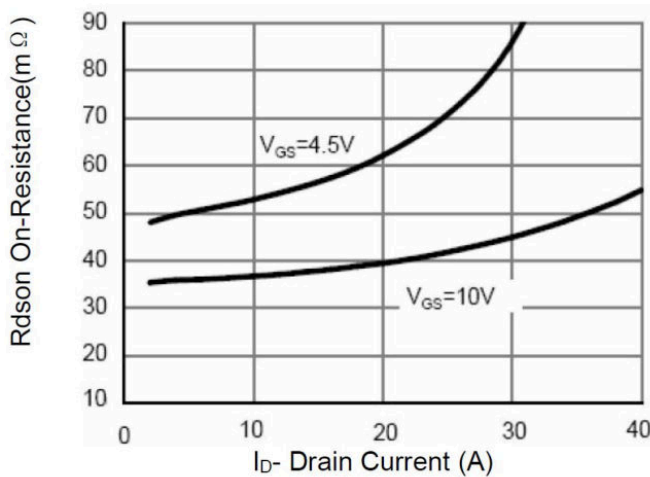
## Typical Characteristics



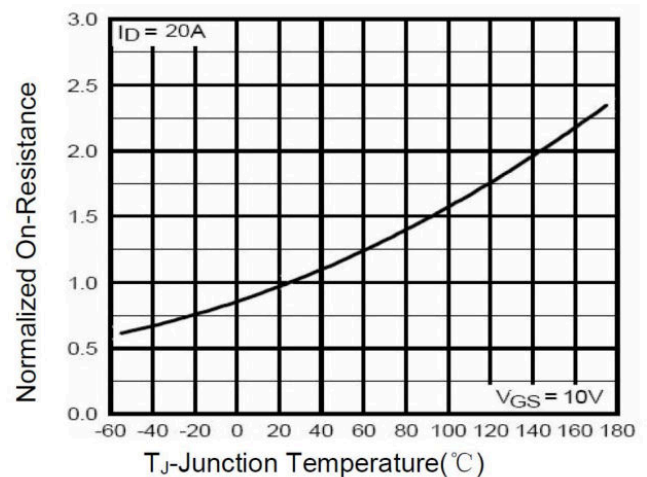
**Figure 1 Output Characteristics**



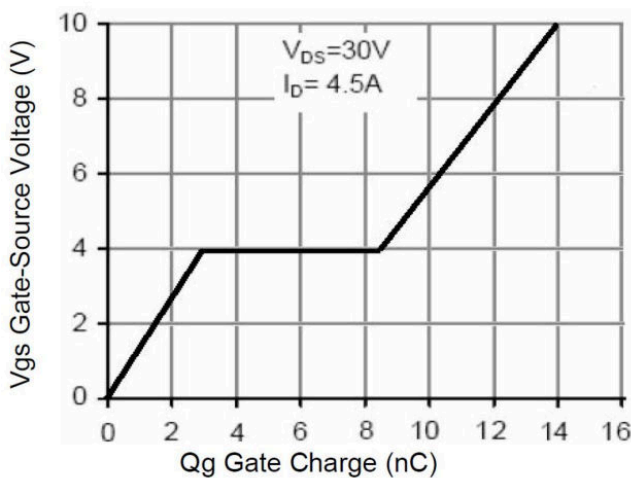
**Figure 2 Transfer Characteristics**



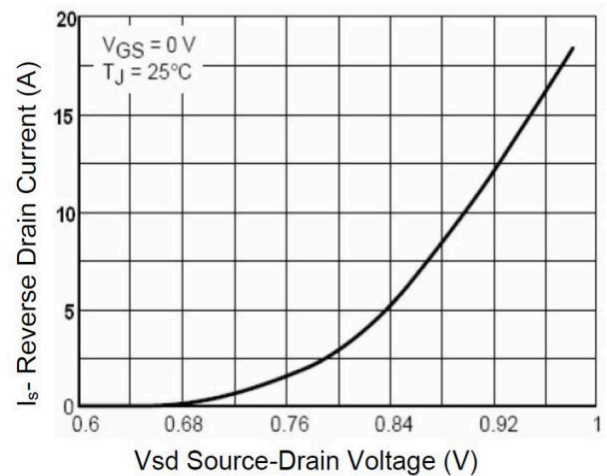
**Figure 3 Rdson- Drain Current**



**Figure 4 Rdson-Junction Temperature**



**Figure 5 Gate Charge**



**Figure 6 Source- Drain Diode Forward**

## Typical Characteristics

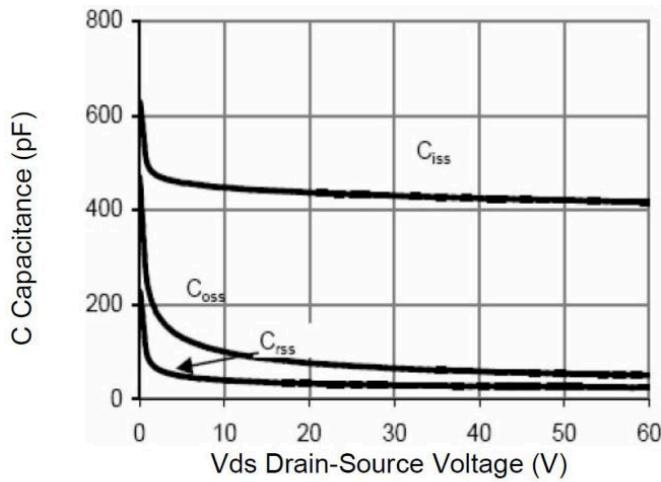


Figure 7 Capacitance vs  $V_{ds}$

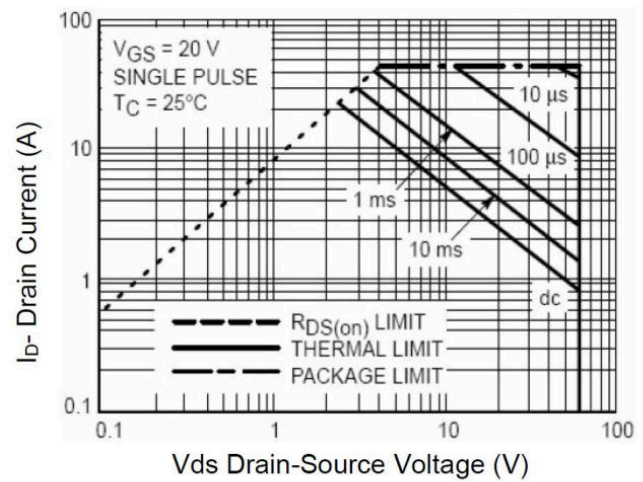


Figure 8 Safe Operation Area

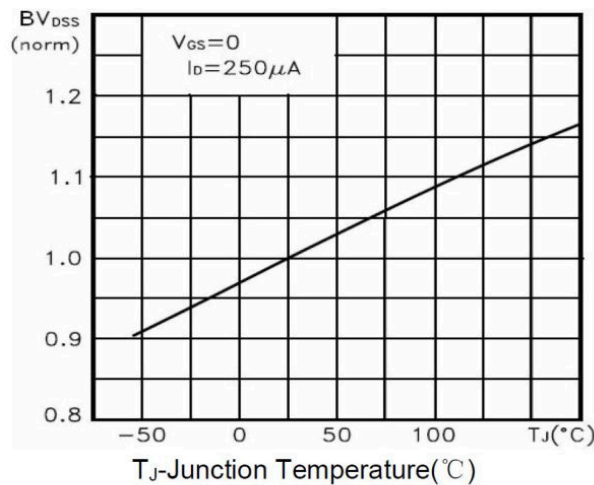


Figure 9  $BV_{DSS}$  vs Junction Temperature

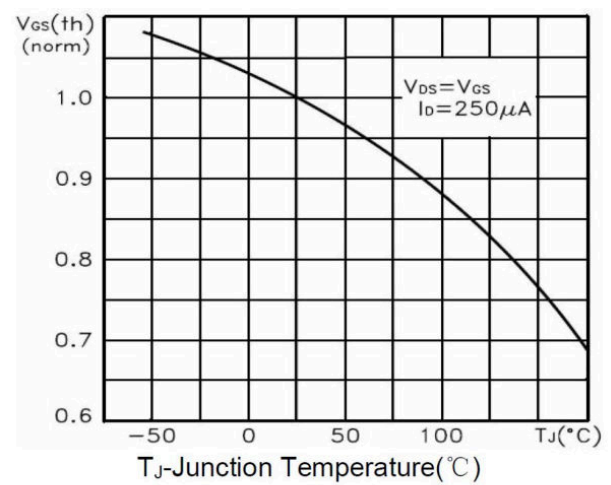


Figure 10  $V_{GS(th)}$  vs Junction Temperature

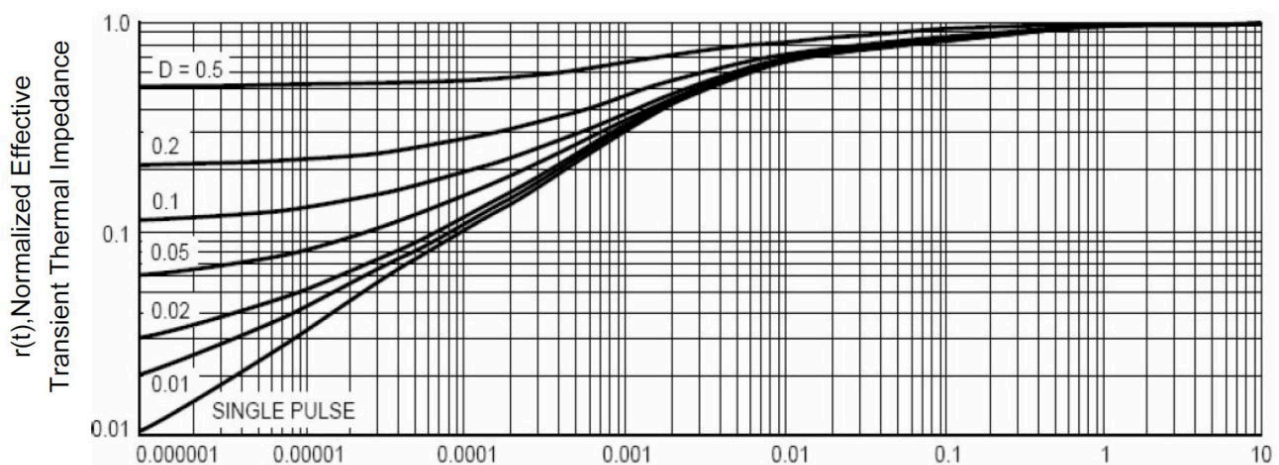
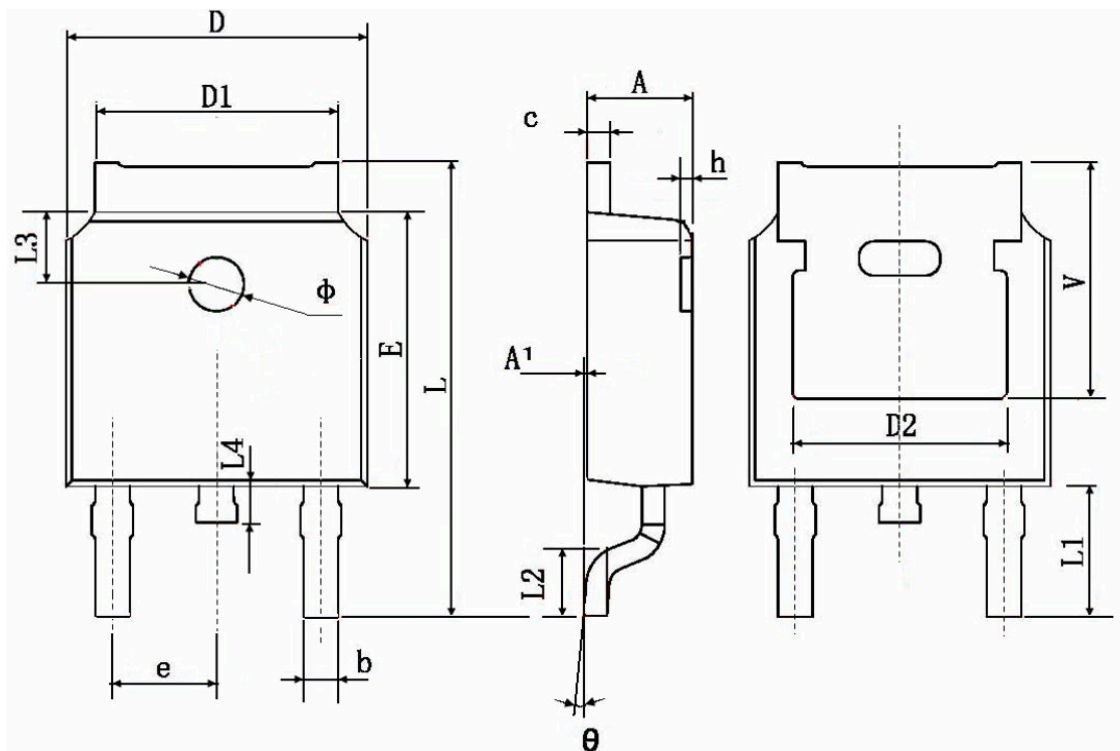


Figure 11 Normalized Maximum Transient Thermal Impedance

### 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	0.127	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 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 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	