

### Product Summary

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

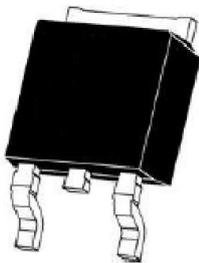
### Feature

- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation

### Application

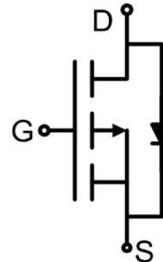
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

### 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>	-40	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current	I <sub>D</sub>	-40	A
Continuous Drain Current (T <sub>c</sub> =100°C)	I <sub>D</sub> (100°C)	-28	A
Pulsed Drain Current	I <sub>DM</sub>	-160	A
Power Dissipation	P <sub>D</sub>	80	W
Thermal Resistance,Junction-to-Ambient	R <sub>θJA</sub>	50	°C/W
Thermal Resistance,Junction-to-Case	R <sub>θJC</sub>	1.88	°C/W
Single pulse avalanche energy	E <sub>AS</sub>	544	mJ
Junction Temperature	T <sub>J</sub>	150	°C
Storage Temperature	T <sub>STG</sub>	-55 ~ +150	°C

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

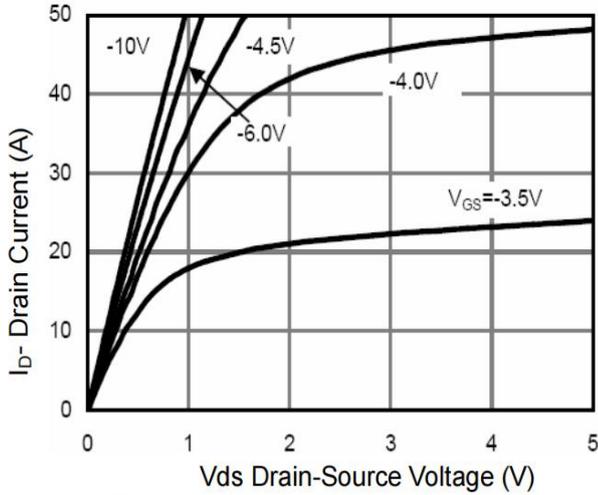
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	-40			V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> = -40V, V <sub>GS</sub> = 0V			-1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V			±100	nA
Gate threshold voltage <sup>1)</sup>	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	-1.5	-1.9	-2.5	V
Drain-source on-resistance <sup>1)</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = -10V, I <sub>D</sub> = -12A		12	14	mΩ
		V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -12A		18.5	24	
<b>Dynamic characteristics<sup>2)</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V, f = 1MHz		2960		pF
Output Capacitance	C <sub>oss</sub>			370		
Reverse Transfer Capacitance	C <sub>rss</sub>			310		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> = -20V, V <sub>GS</sub> = -10V, I <sub>D</sub> = -12A		42.2		nC
Gate-Source Charge	Q <sub>gs</sub>			6.9		
Gate-Drain Charge	Q <sub>gd</sub>			9.7		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DD</sub> = -20V, V <sub>GS</sub> = -10V, I <sub>D</sub> = -12A, R <sub>GEN</sub> = 3.0Ω		10		nS
Turn-on rise time	t <sub>r</sub>			18		
Turn-off delay time	t <sub>d(off)</sub>			38		
Turn-off fall time	t <sub>f</sub>			24		
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	I <sub>S</sub>				-40	A
Diode Forward voltage <sup>1)</sup>	V <sub>DS</sub>	V <sub>GS</sub> = 0V, I <sub>S</sub> = -12A			-1.2	V
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> = 25°C, I <sub>F</sub> = -12A, di/dt = 100A/μs <sup>1)</sup>		40		nS
Reverse Recovery Charge	Q <sub>rr</sub>			42		nC

Notes:

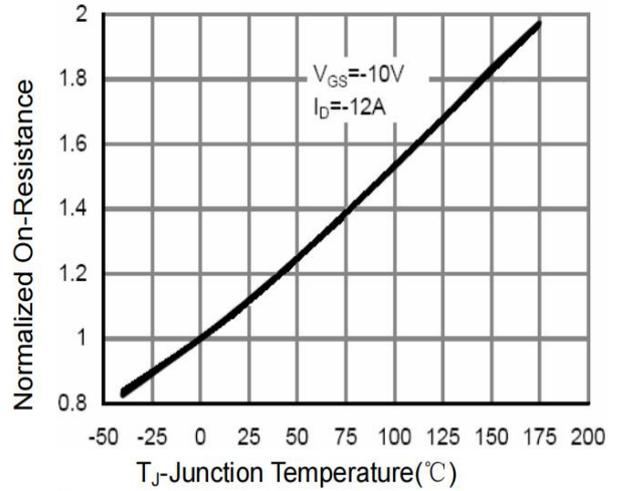
1) Pulse Test: Pulse Width < 300μs, Duty Cycle ≤2%.

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

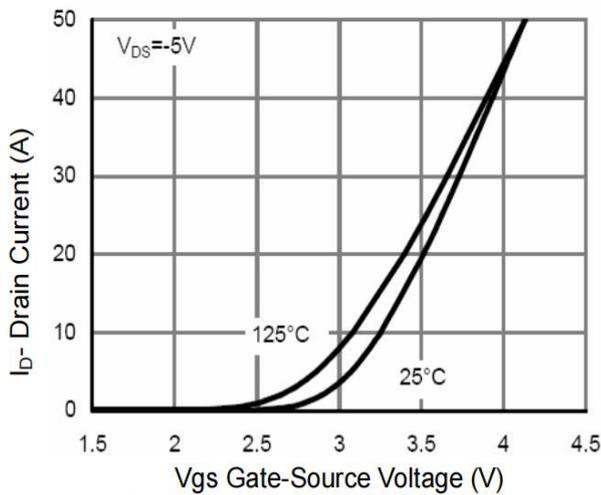
## Typical Characteristics



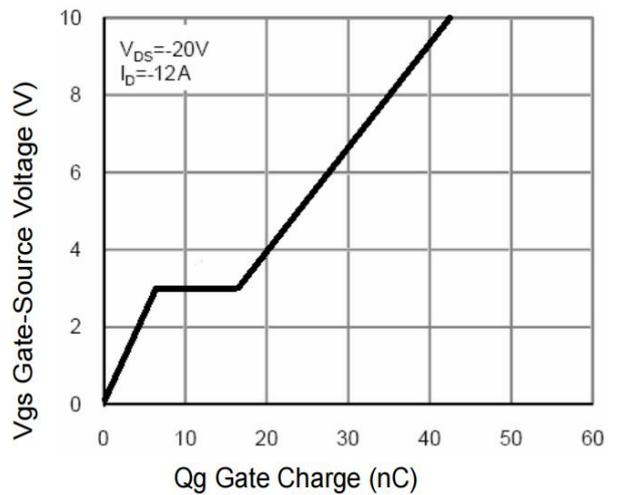
**Figure 1 Output Characteristics**



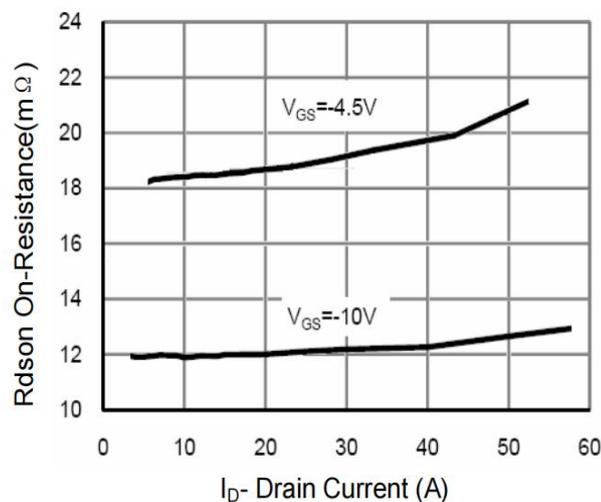
**Figure 2 Rdson-Junction Temperature**



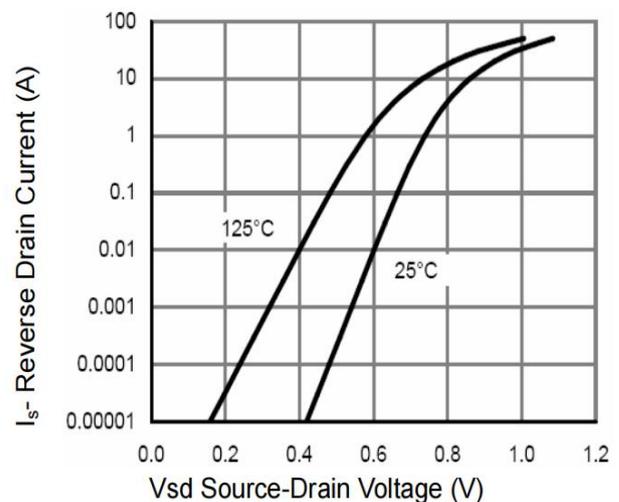
**Figure 3 Transfer Characteristics**



**Figure 4 Gate Charge**

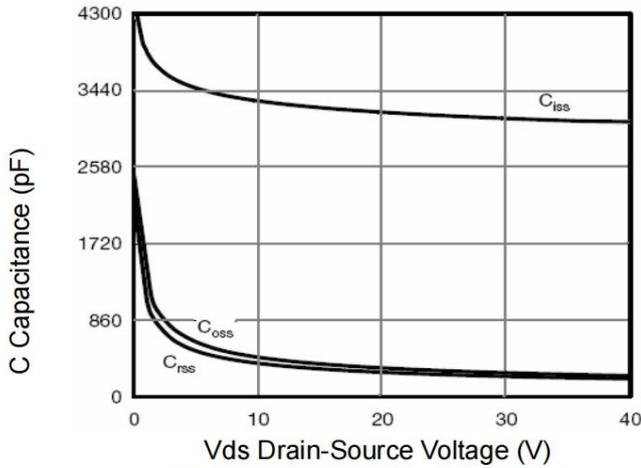


**Figure 5 Rdson- Drain Current**

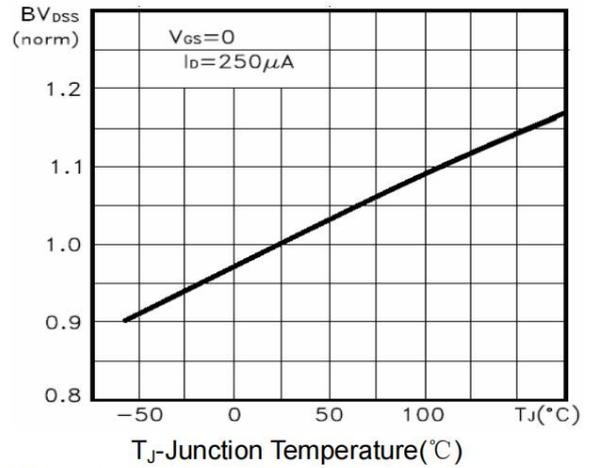


**Figure 6 Source- Drain Diode Forward**

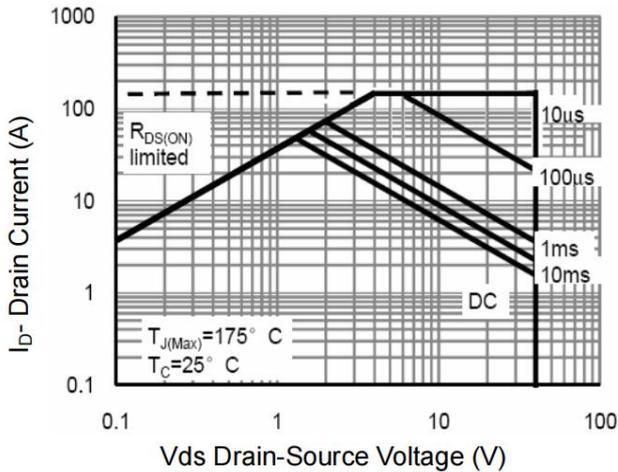
## Typical Characteristics



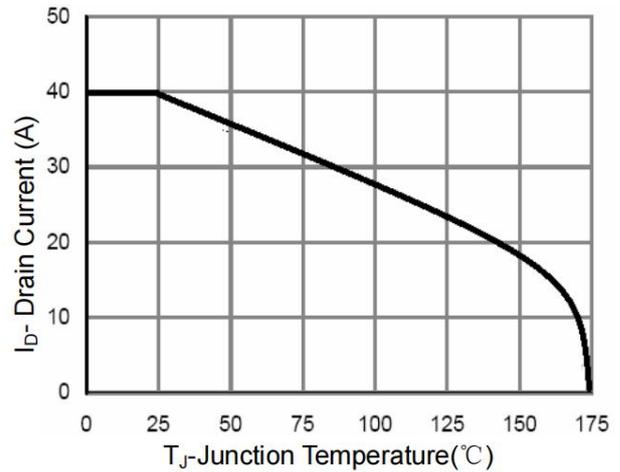
**Figure 7 Capacitance vs Vds**



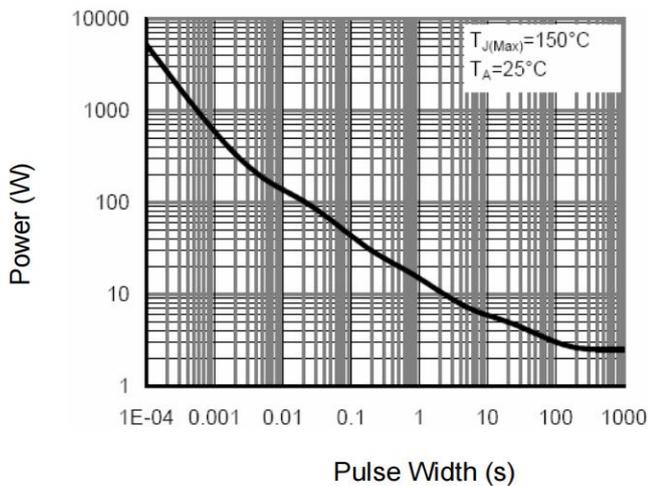
**Figure 8 BV<sub>DSS</sub> vs Junction Temperature**



**Figure 9 Safe Operation Area**

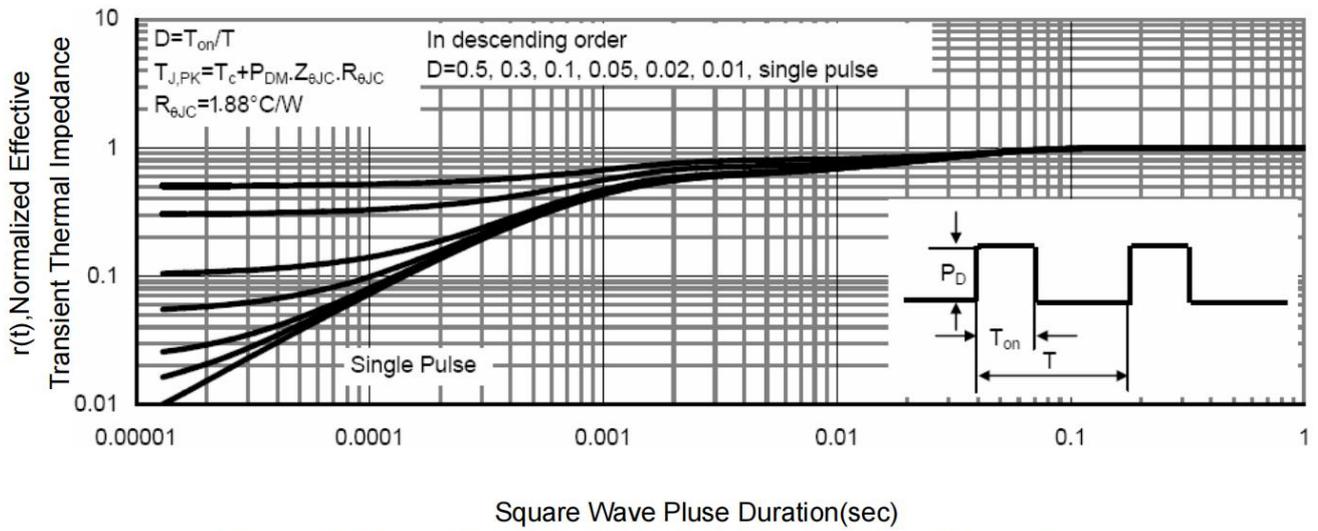


**Figure 10 ID Current Derating vs Junction Temperature**



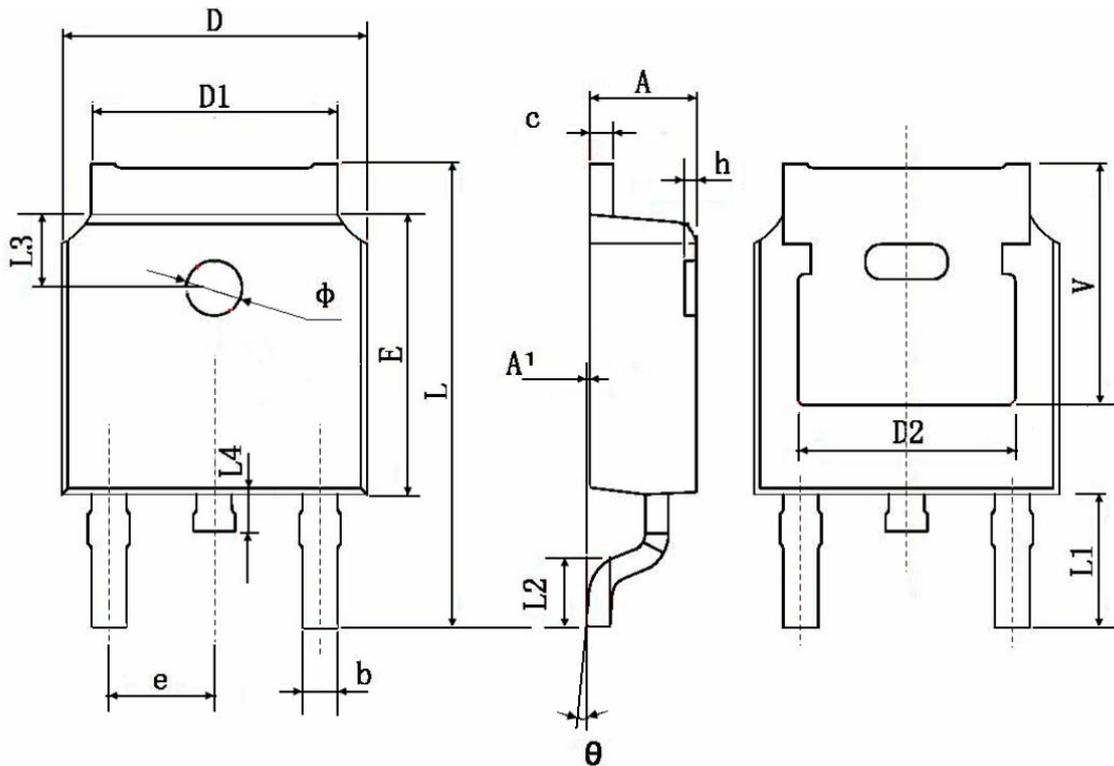
**Figure 11 Single Pulse Power Rating Junction-to-Ambient**

## Typical Characteristics



**Figure 12 Normalized Maximum Transient Thermal Impedance**

### 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
$\theta$	0°	10°	0°	10°
$\phi$	1.100	1.300	0.043	0.051
h	0.000	0.300	0.000	0.012
v	5.350 TYP		0.211 TYP	