

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
60V	35mΩ@10V	20A
	40mΩ@4.5V	

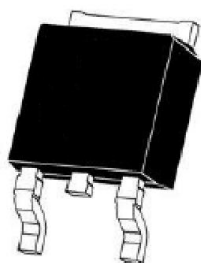
Feature

- High density cell design for ultra low $R_{DS(ON)}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high EAS
- Excellent package for good heat dissipation
- Special process technology for high ESD capability
- Suffix “-Q1” for AEC-Q101

Application

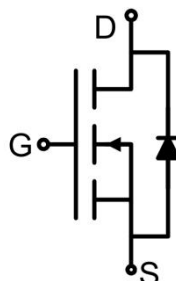
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

Package

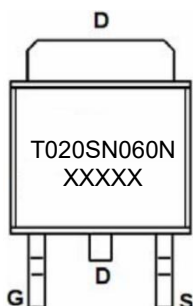


TO-252AB

Circuit diagram



Marking



Absolute maximum ratings ($T_c=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	20	A
Continuous Drain Current ($T_c=100^\circ\text{C}$)	$I_{D(100^\circ\text{C})}$	14	A
Pulsed Drain Current ¹⁾	I_{DM}	60	A
Single Pulse Avalanche Energy ⁴⁾	E_{AS}	72	mJ
Maximum Power Dissipation	P_D	45	W
Thermal Resistance Junction to Case	$R_{\theta JC}$	3.3	$^\circ\text{C/W}$
Operating Junction Temperature	T_J	$-55 \sim +175$	$^\circ\text{C}$
Storage Temperature Range	T_{STG}	$-55 \sim +175$	$^\circ\text{C}$

Electrical characteristics ($T_c=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	60			V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$			1	μA
Gate-body leakage current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.6	2.5	V
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$		24	35	m Ω
		$V_{GS}=4.5V, I_D=10A$		30	40	
Dynamic characteristics ⁵⁾						
Input Capacitance	C_{iss}	$V_{DS}=30V, V_{GS}=0V, f=1MHz$		973.2		pF
Output Capacitance	C_{oss}			61.2		
Reverse Transfer Capacitance	C_{rss}			58.8		
Total Gate Charge	Q_g	$V_{DS}=30V, V_{GS}=10V, I_D=10A$		25		nC
Gate-Source Charge	Q_{gs}			4.5		
Gate-Drain Charge	Q_{gd}			6.5		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=30V, V_{GS}=10V, R_G=3\Omega$ $R_L=3\Omega$		7		nS
Turn-on rise time	t_r			20		
Turn-off delay time	$t_{d(off)}$			16		
Turn-off fall time	t_f			23		
Source-Drain Diode characteristics						
Diode Forward Current ²⁾	I_S				20	A
Diode Forward voltage ³⁾	V_{SD}	$V_{GS}=0V, I_S=10A$			1.2	V
Reverse Recovery Time	T_{rr}	$I_F=10A, di/dt=100A/\mu s^3)$		29		nS
Reverse Recovery Charge	Q_{rr}	$T_J=25^{\circ}C$		49		nC

Notes:

- 1) Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2) The value of $R_{\theta JA}$ is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^\circ\text{C}$. The value in any given application depends on the user's specific board design, and the maximum temperature of 150°C may be used if the PCB allows it.
- 3) Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- 4) EAS condition: $T_J=25^\circ\text{C}, V_{DS}=30V, V_G=10V, L=0.5mH, R_G=25\Omega$.
- 5) Guaranteed by design, not subject to production.

Typical Characteristics

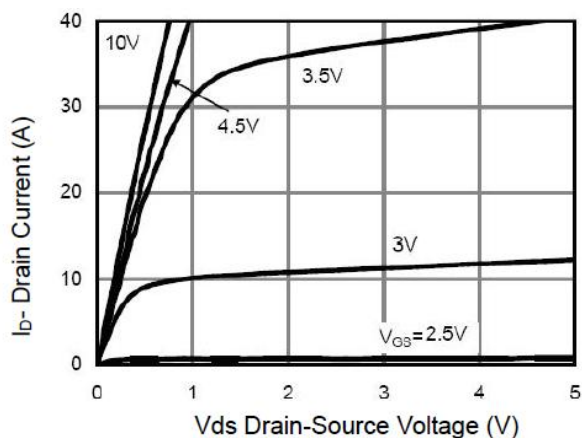


Figure 1 Output Characteristics

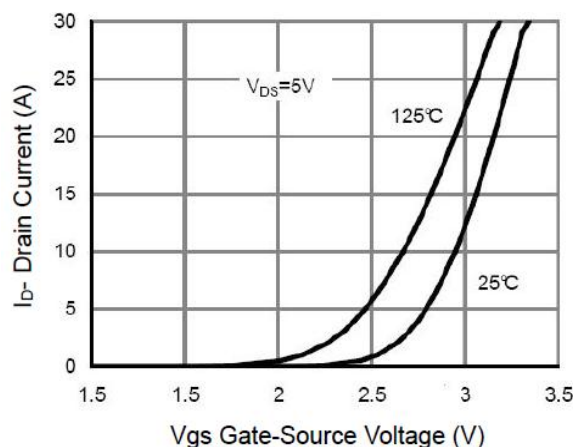


Figure 2 Transfer Characteristics

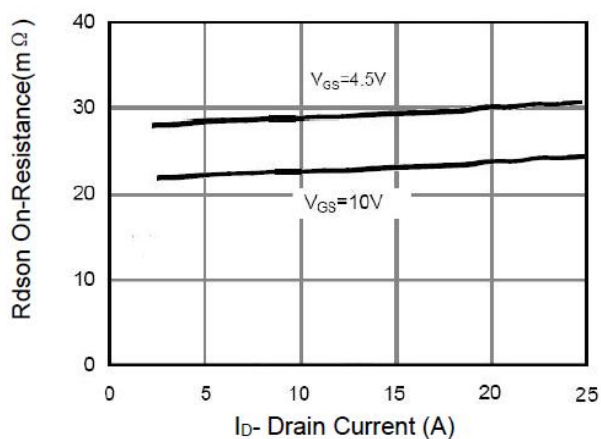


Figure 3 $R_{DS(on)}$ - Drain Current

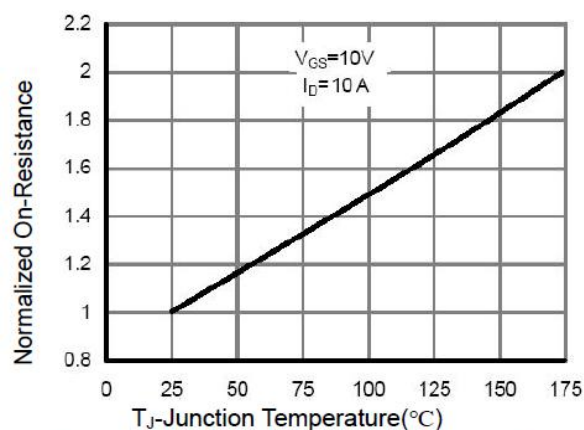


Figure 4 $R_{DS(on)}$ -Junction Temperature

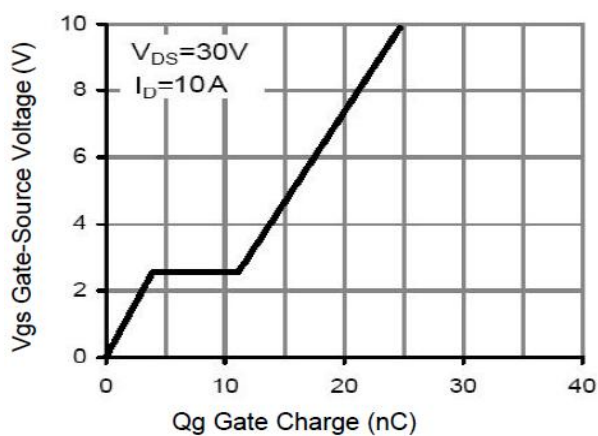


Figure 5 Gate Charge

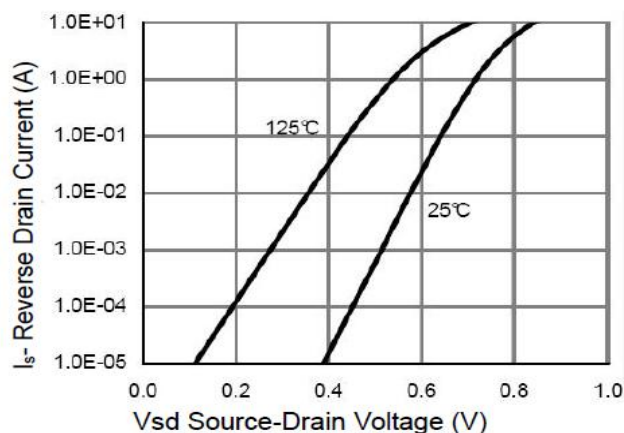


Figure 6 Source- Drain Diode Forward

Typical Characteristics

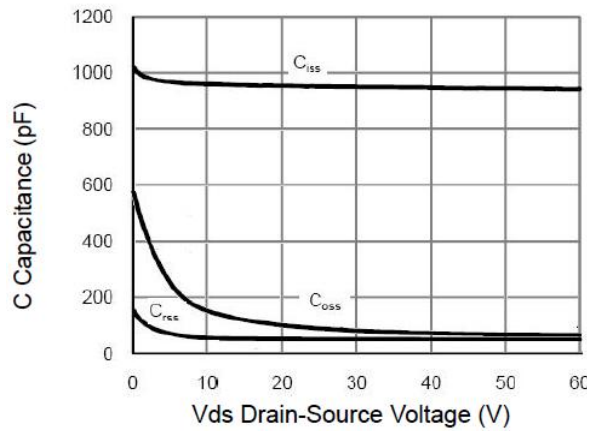


Figure 7 Capacitance vs Vds

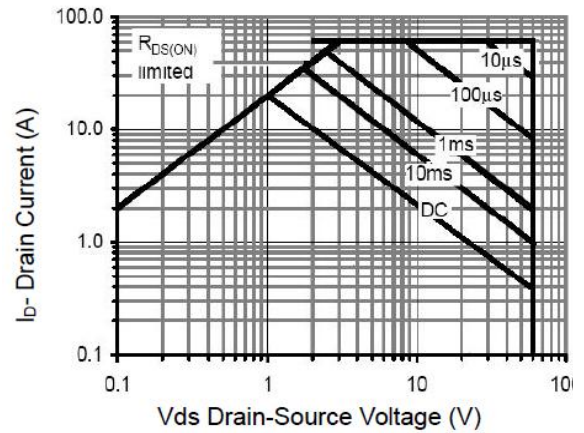


Figure 8 Safe Operation Area

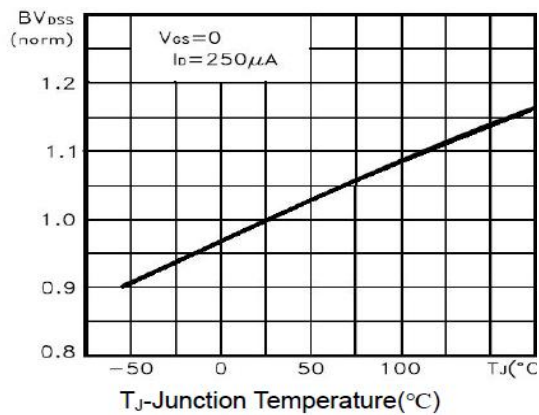


Figure 9 BV_{DSS} vs Junction Temperature

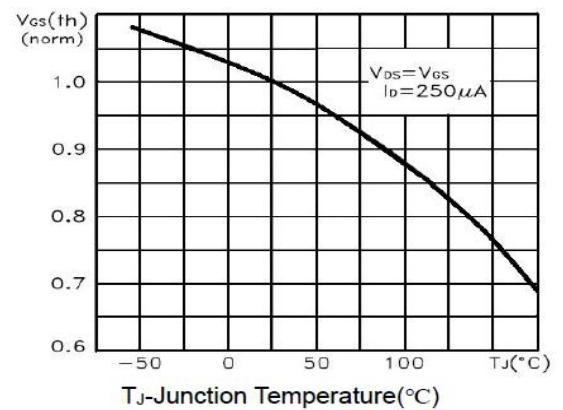


Figure 10 $V_{GS(th)}$ vs Junction Temperature

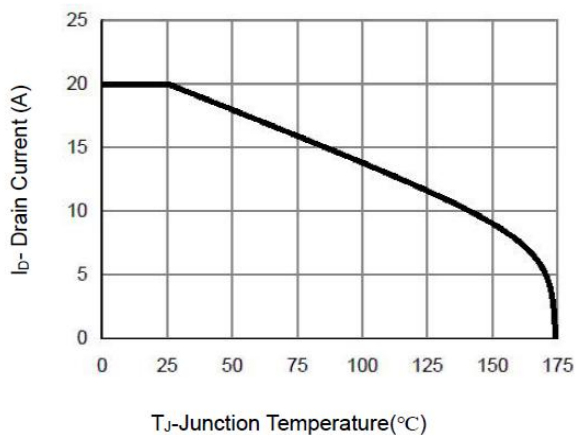


Figure 11 Current De-rating

Typical Characteristics

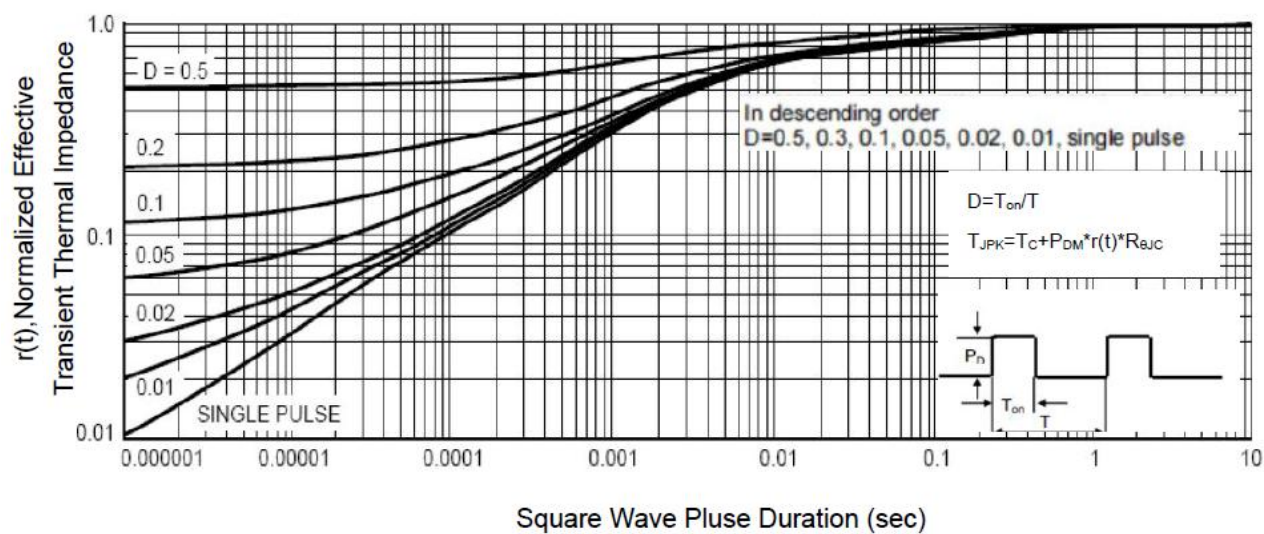
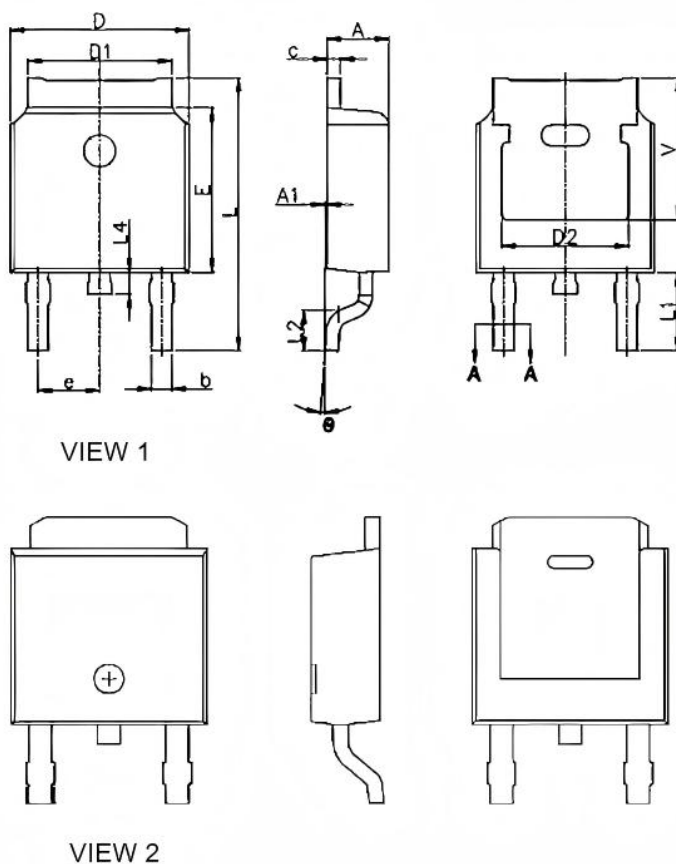


Figure 12 Normalized Maximum Transient Thermal Impedance

TO-252AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.180	2.400	0.086	0.094
A1	0.000	0.130	0.000	0.005
b	0.650	0.890	0.026	0.035
c	0.460	0.610	0.018	0.024
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	5.970	6.220	0.235	0.245
e	2.186	2.390	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.780	0.055	0.070
L4	0.600	1.020	0.024	0.040
θ	0°	10°	0°	10°
V	5.350 REF.		0.211 REF.	