

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-40V	15mΩ@-10V	-50A
	22mΩ@-4.5V	

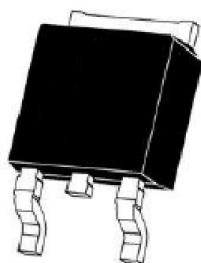
Feature

- Low $R_{DS(on)}$ & FOM
- Extremely low switching loss
- Excellent stability and uniformity
- Suffix "-Q1" for AEC-Q101

Application

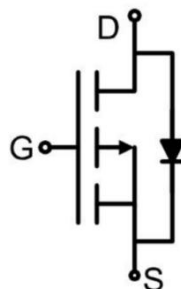
- Power management
- Portable equipment

Package

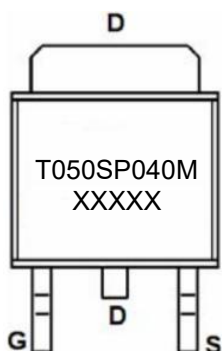


TO-252AB

Circuit diagram



Marking



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_C=25^{\circ}\text{C}$, $V_{GS}=-10\text{V}$)	I_D	-50	A
Continuous Drain Current ($T_C=100^{\circ}\text{C}$, $V_{GS}=-10\text{V}$)	$I_D (100^{\circ}\text{C})$	-31	A
Pulsed Drain Current ¹⁾ ($T_C=25^{\circ}\text{C}$, $t_p \leq 10\mu\text{s}$)	I_{DM}	-200	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	22.5	mJ
Power Dissipation ³⁾ ($T_C=25^{\circ}\text{C}$)	P_D	83	W
Thermal Resistance Junction to Case	$R_{\theta JC}$	1.5	$^{\circ}\text{C/W}$
Operating Junction Temperature	T_J	-55 ~ +150	$^{\circ}\text{C}$
Storage Temperature	T_{STG}	-55 ~ +150	$^{\circ}\text{C}$

Electrical characteristics ($T_J=25^{\circ}\text{C}$ 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 =-250μA	-40			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V			-1	μA
Gate-body leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1	-1.5	-2.5	V
Drain-source on-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-20A		11.5	15	mΩ
		V _{GS} =-4.5V, I _D =-20A		14	22	
Dynamic characteristics ⁴⁾						
Input Capacitance	C _{iss}	V _{DS} =-25V, V _{GS} =0V, f =1MHz		3500		pF
Output Capacitance	C _{oss}			270		
Reverse Transfer Capacitance	C _{rss}			230		
Total Gate Charge	Q _g	V _{DS} =-20V, V _{GS} =-10V I _D =-25A		73.3		nC
Gate-Source Charge	Q _{gs}			8.9		
Gate-Drain Charge	Q _{gd}			15.3		
Turn-on delay time	t _{d(on)}	V _{DS} =-20V, V _{GS} =-10V I _D =-25A, R _G =6Ω		13.6		nS
Turn-on rise time	t _r			11.8		
Turn-off delay time	t _{d(off)}			201.5		
Turn-off fall time	t _f			92.5		
Source-Drain Diode characteristics						
Diode Forward Current	I _S				-50	A
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-20A			-1.2	V
Reverse Recovery Time	T _{rr}	I _F =-25A, di/dt =-100A/μs		25.4		nS
Reverse Recovery Charge	Q _{rr}			12.9		nC

Notes:

- 1) Repetitive rating; pulse width limited by max. junction temperature.
- 2) $T_J=25^{\circ}\text{C}$, $V_G=-10\text{V}$, $L=0.5\text{mH}$, $I_{AS}=-9.5\text{A}$.
- 3) P_d is based on max. junction temperature, using junction-case thermal resistance.
- 4) Guaranteed by design, not subject to production testing.

Typical Characteristics

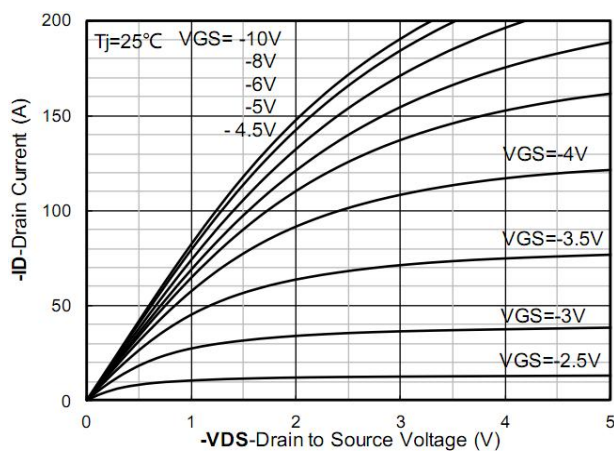


Figure 1. Output Characteristics

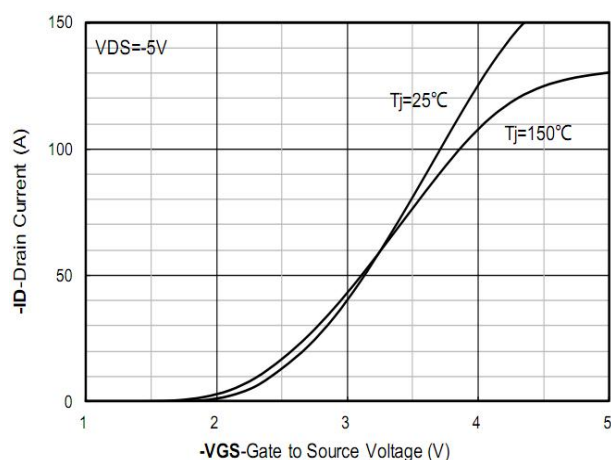


Figure 2. Transfer Characteristics

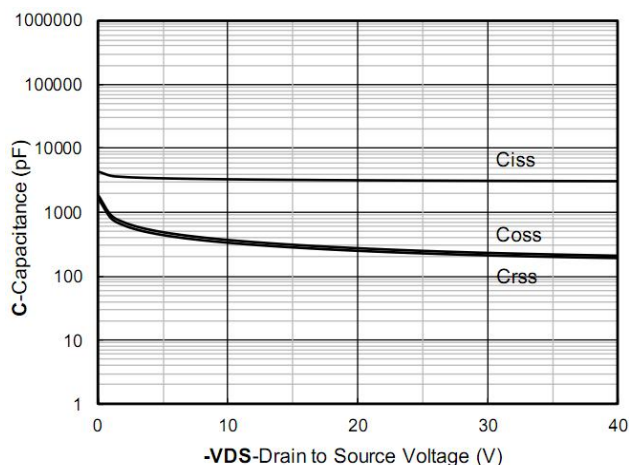


Figure 3. Capacitance Characteristics

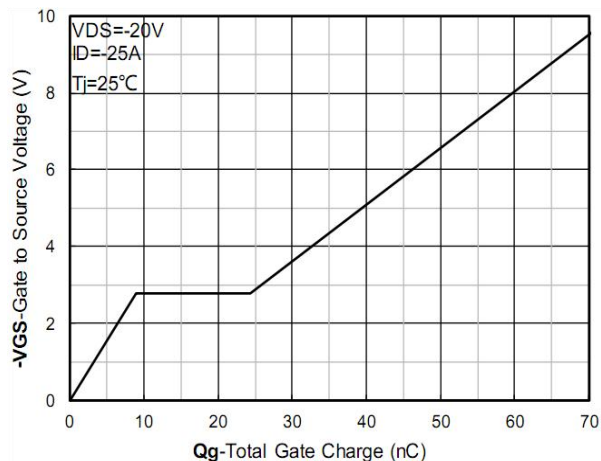


Figure 4. Gate Charge

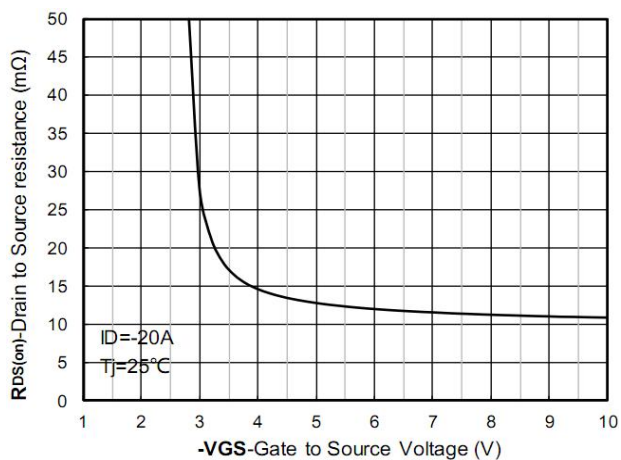


Figure 5. On-Resistance vs Gate to Source Voltage

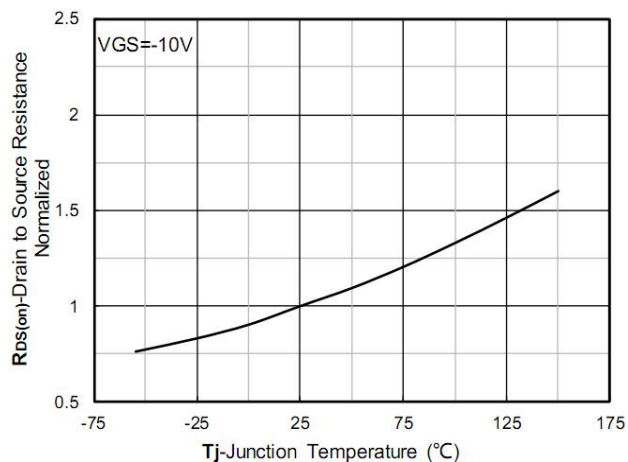


Figure 6. Normalized On-Resistance

Typical Characteristics

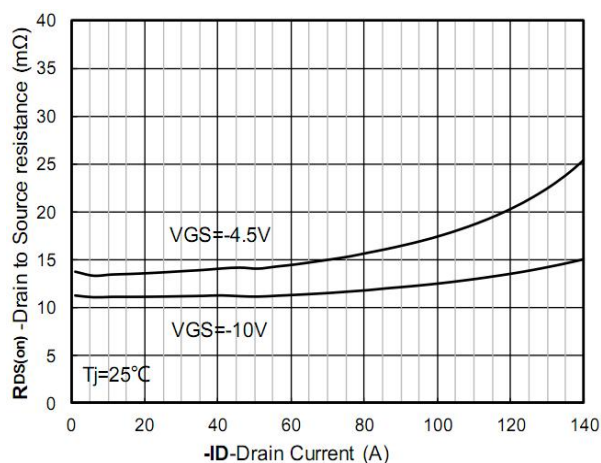


Figure 7. RDS(on) VS Drain Current

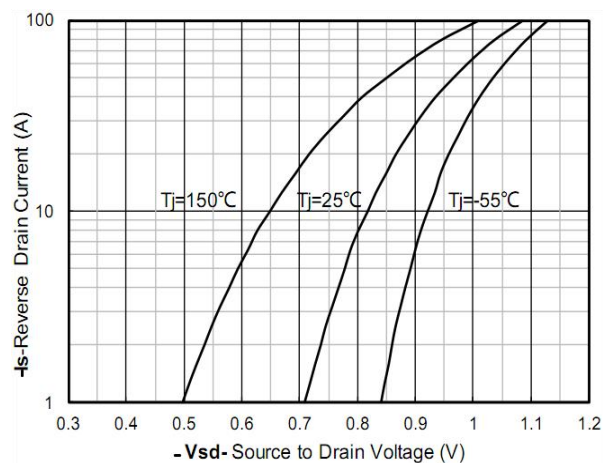


Figure 8. Forward characteristics of reverse diode

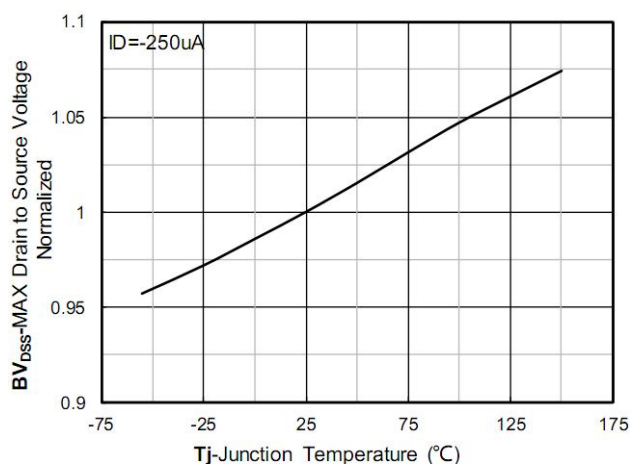


Figure 9. Normalized breakdown voltage

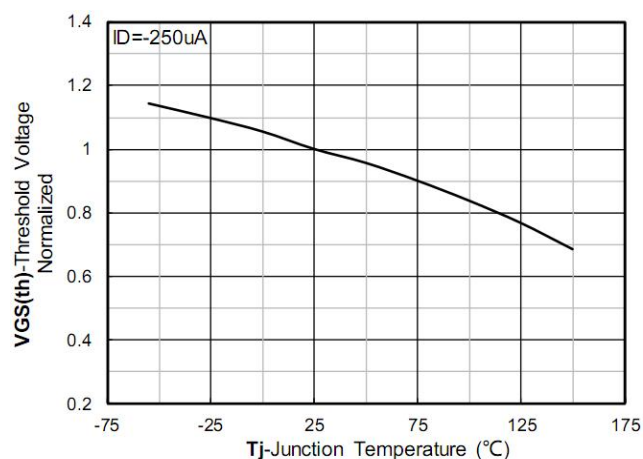


Figure 10. Normalized Threshold voltage

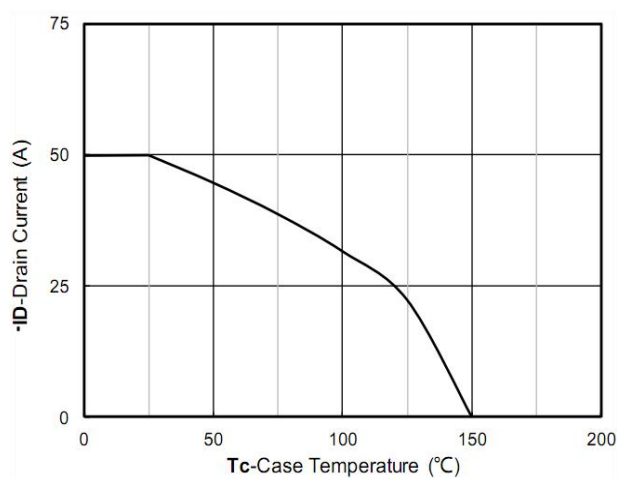


Figure 11. Current dissipation

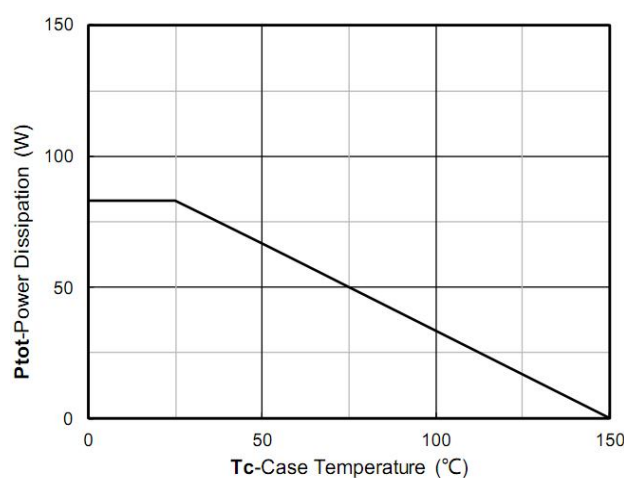


Figure 12. Power dissipation

Typical Characteristics

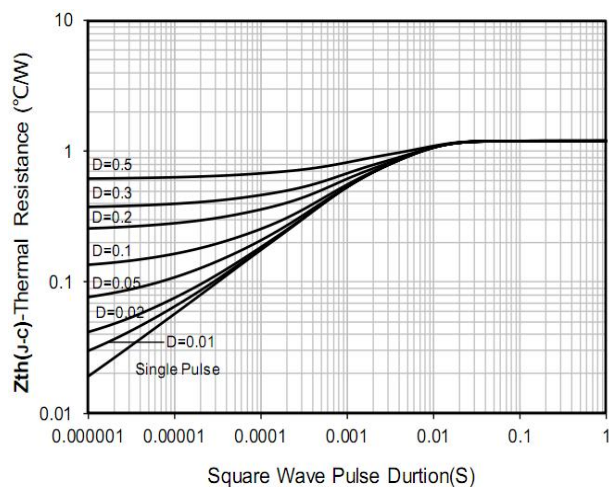


Figure 13. Maximum Transient Thermal Impedance

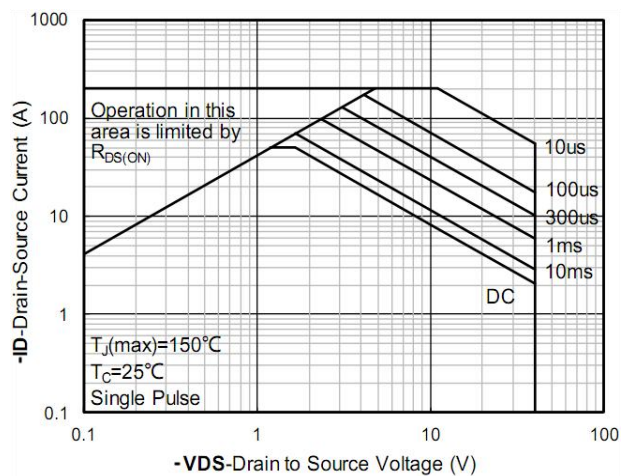
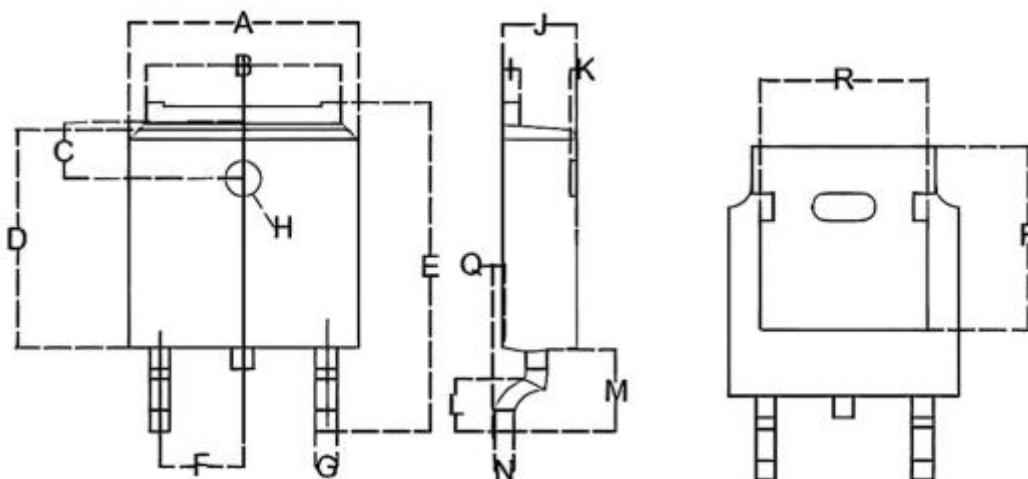


Figure 14. Safe Operation Area

TO-252AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	6.500	6.700	0.256	0.264
B	5.100	5.460	0.201	0.215
C	1.400	1.800	0.055	0.071
D	6.000	6.200	0.236	0.244
E	10.000	10.400	0.394	0.409
F	2.166	2.366	0.085	0.093
G	0.660	0.860	0.026	0.034
φ H	1.050	1.350	1.050	1.350
I	0.460	0.580	0.018	0.023
J	2.200	2.400	0.087	0.094
K	0.000	0.300	0.000	0.012
L	0.890	2.290	0.035	0.090
M	2.730	3.080	0.107	0.121
N	0.430	0.580	0.017	0.023
P	5.150	5.450	0.203	0.215
Q	0.000	0.200	0.000	0.008
R	4.500	5.100	0.177	0.201