

## Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
-40V	7.6mΩ@-10V	-84A

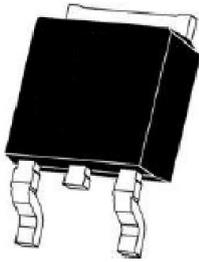
## Feature

- Surface-mounted package
- Suffix "-Q1" for AEC-Q101

## Application

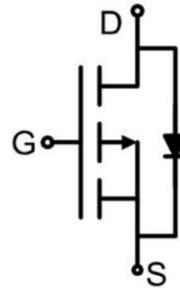
- Power management
- Portable equipment

## Package

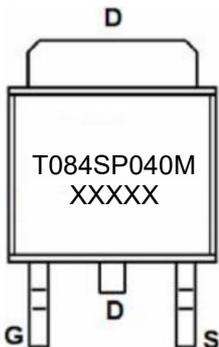


TO-252AB

## 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	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_C=25^\circ\text{C}$ )	$I_D$	-84	A
Continuous Drain Current ( $T_C=100^\circ\text{C}$ )	$I_D (100^\circ\text{C})$	-59	A
Pulsed Drain Current <sup>1)</sup>	$I_{DM}$	-350	A
Single Pulse Avalanche Energy <sup>2)</sup>	$E_{AS}$	211	mJ
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	83.3	W
Thermal Resistance Junction to Case	$R_{\theta JC}$	1.8	$^\circ\text{C}/\text{W}$
Operating Junction Temperature	$T_J$	-55 ~ +175	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ +175	$^\circ\text{C}$

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

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{V}, I_D = -250\mu\text{A}$	-40			V
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = -32\text{V}, V_{GS} = 0\text{V}$			-1	$\mu\text{A}$
Gate-body leakage current	$I_{GSS}$	$V_{DS} = 0\text{V}, V_{GS} = \pm 16\text{V}$			$\pm 100$	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu\text{A}$	-2	-3.1	-4	V
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS} = -10\text{V}, I_D = -30\text{A}$		6.4	7.6	m $\Omega$
<b>Dynamic characteristics<sup>3)</sup></b>						
Input Capacitance	$C_{iss}$	$V_{DS} = -20\text{V}, V_{GS} = 0\text{V}, f = 1\text{MHz}$		7516		pF
Output Capacitance	$C_{oss}$			551		
Reverse Transfer Capacitance	$C_{rss}$			323		
Total Gate Charge	$Q_g$	$V_{DS} = -20\text{V}, V_{GS} = -10\text{V}$ $I_D = -20\text{A}$		105		nC
Gate-Source Charge	$Q_{gs}$			41		
Gate-Drain Charge	$Q_{gd}$			19.6		
Turn-on delay time	$t_{d(on)}$	$V_{DS} = -20\text{V}, V_{GS} = -10\text{V}$ $I_D = -20\text{A}, R_G = 3.3\Omega$		44		nS
Turn-on rise time	$t_r$			75.6		
Turn-off delay time	$t_{d(off)}$			30		
Turn-off fall time	$t_f$			10		
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	$I_S$				-84	A
Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{V}, I_S = -1\text{A}$			-1.2	V
Reverse Recovery Time	$T_{rr}$	$I_F = -20\text{A}, di/dt = -100\text{A}/\mu\text{s}$		31		nS
Reverse Recovery Charge	$Q_{rr}$			38		nC

Notes:

- 1) Pulse Test: Pulse Width  $\leq 100\mu\text{s}$ , Duty Cycle  $\leq 2\%$ , Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 175^\circ\text{C}$
- 2) Limited by  $T_{J(MAX)}$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.1\text{mH}$ ,  $R_G = 25\Omega$ ,  $I_{AS} = -65\text{A}$ ,  $V_{GS} = -10\text{V}$ .
- 3) Guaranteed by design, not subject to production testing.

## Typical Characteristics

Fig. 1 Typical Output Characteristics

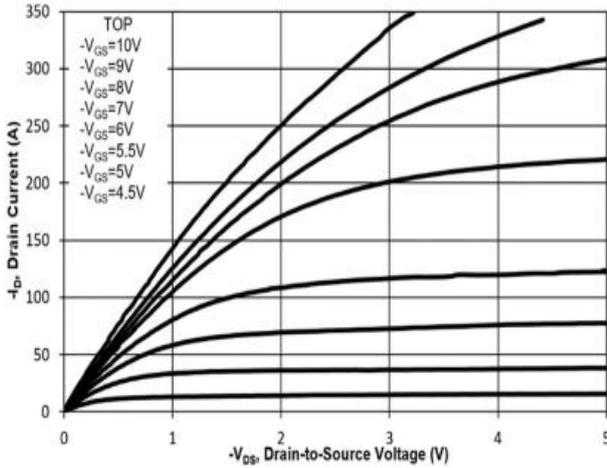


Fig. 2 Typical Transfer Characteristics

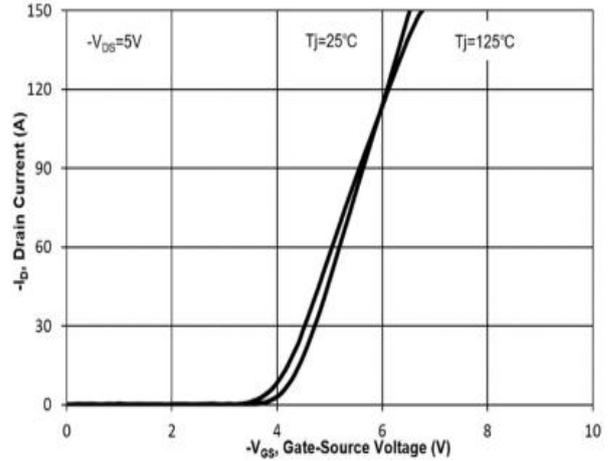


Fig. 3 on-Resistance vs Drain Current

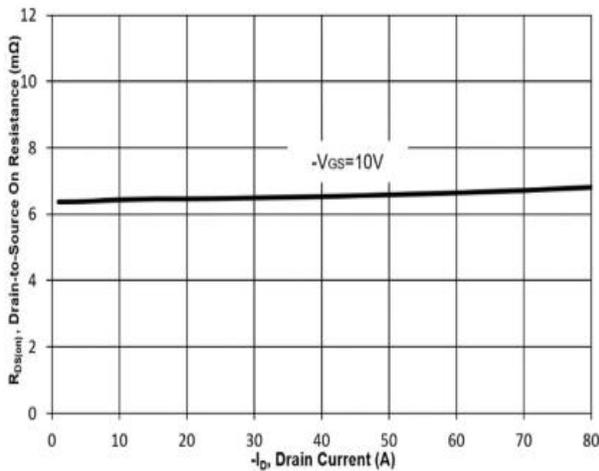


Fig. 4 on-Resistance vs. Gate to Source Voltage

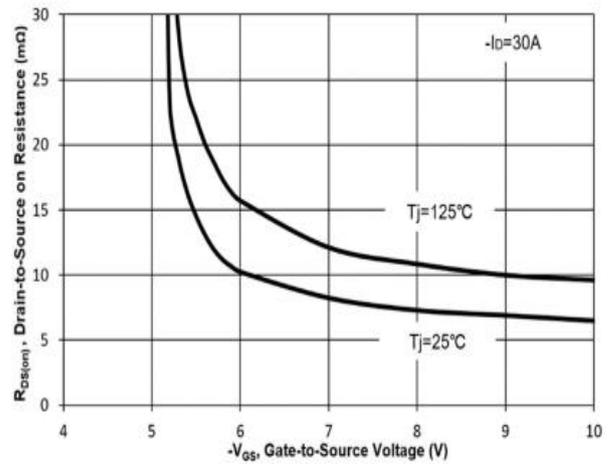


Fig. 5 on-Resistance vs.  $T_J$

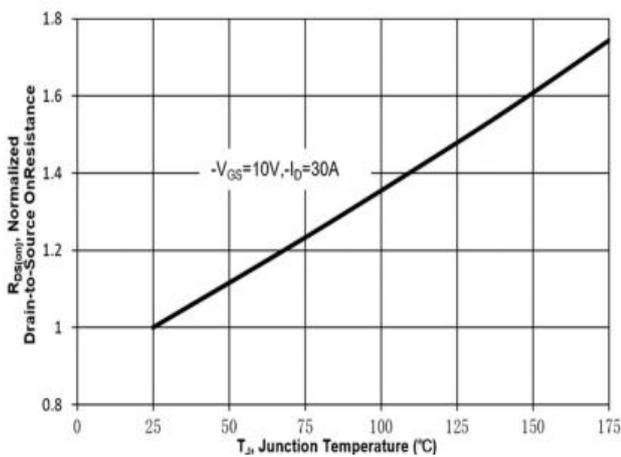
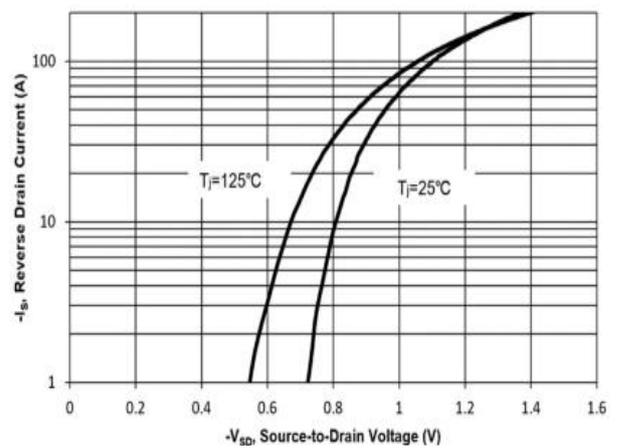


Fig. 6 Typical Body-Diode Forward Characteristics



## Typical Characteristics

Fig. 7 Typical Junction Capacitance

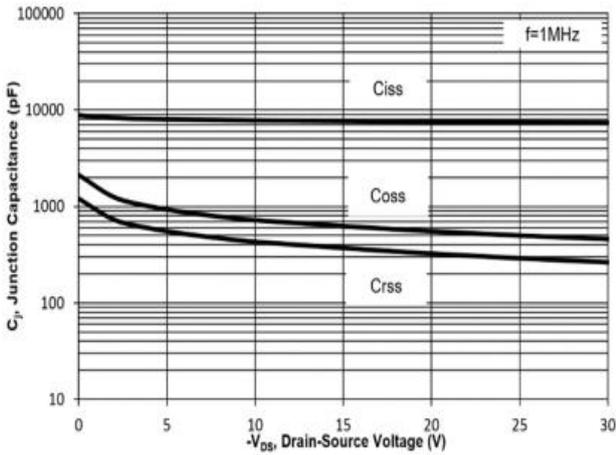


Fig. 8 Drain-Source Leakage Current vs. Tj

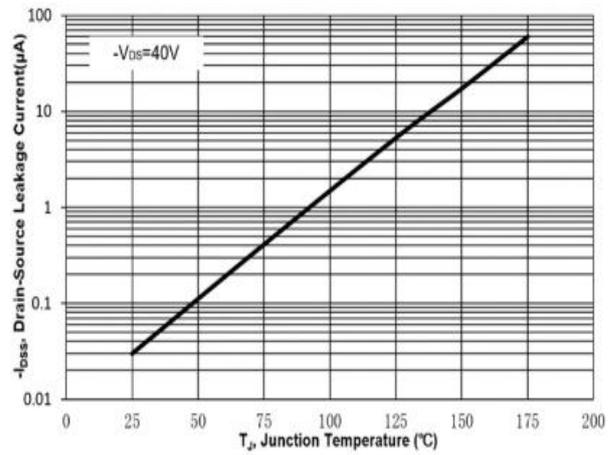


Fig. 9 V(BR)DSS vs. Junction Temperature

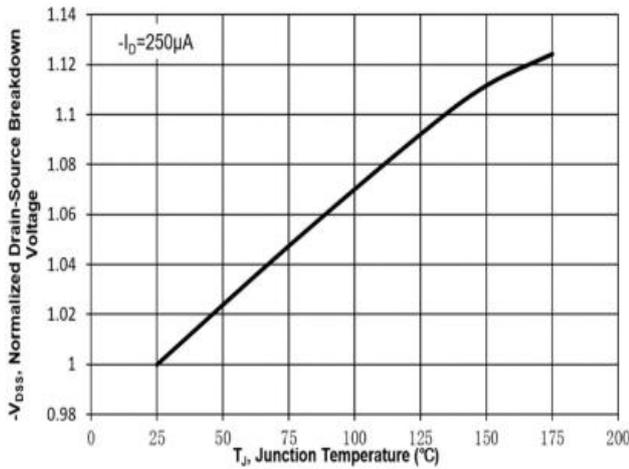


Fig. 10 Gate Threshold Variation vs. Tj

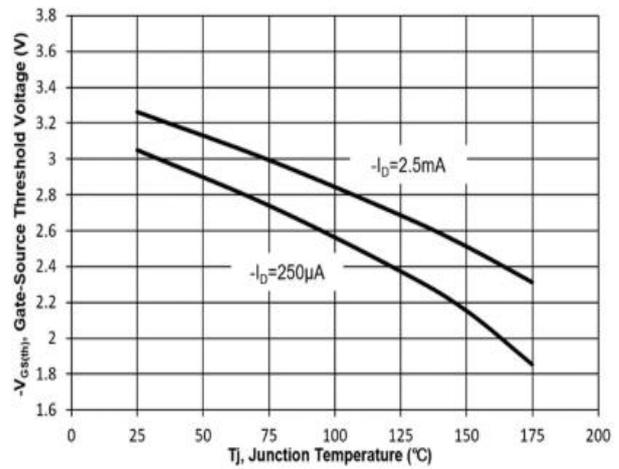


Fig. 11 Gate Charge

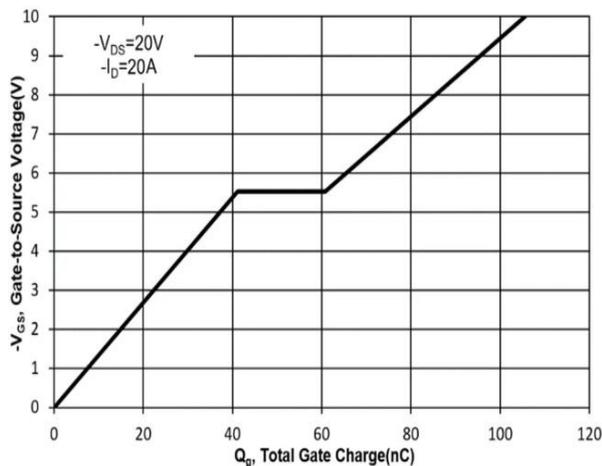
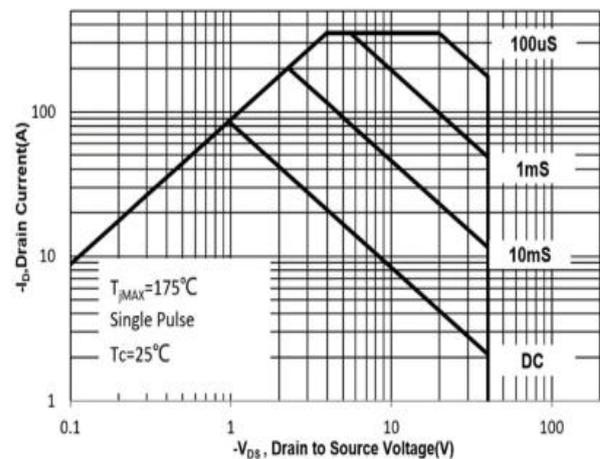


Fig. 12 Safe Operation Area



## Typical Characteristics

Fig.13 Normalized Maximum Transient Thermal Impedance( $Z_{\theta JC}$ )

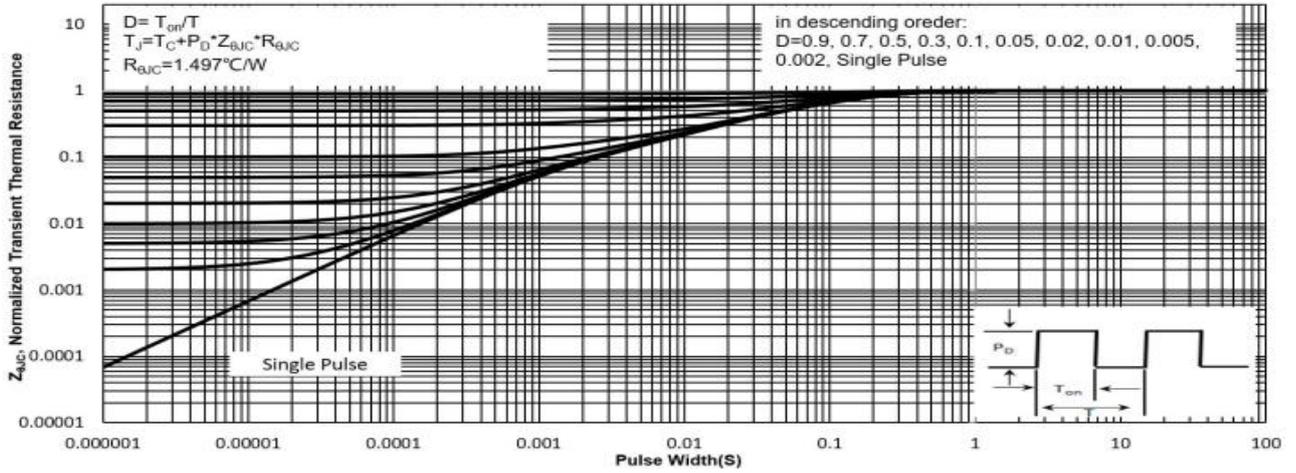
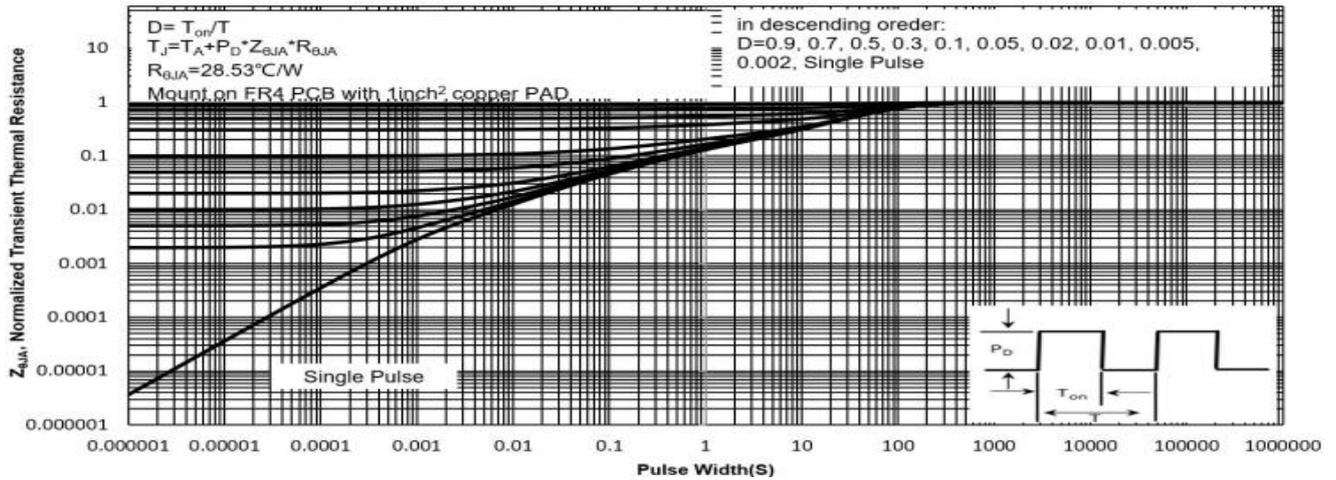
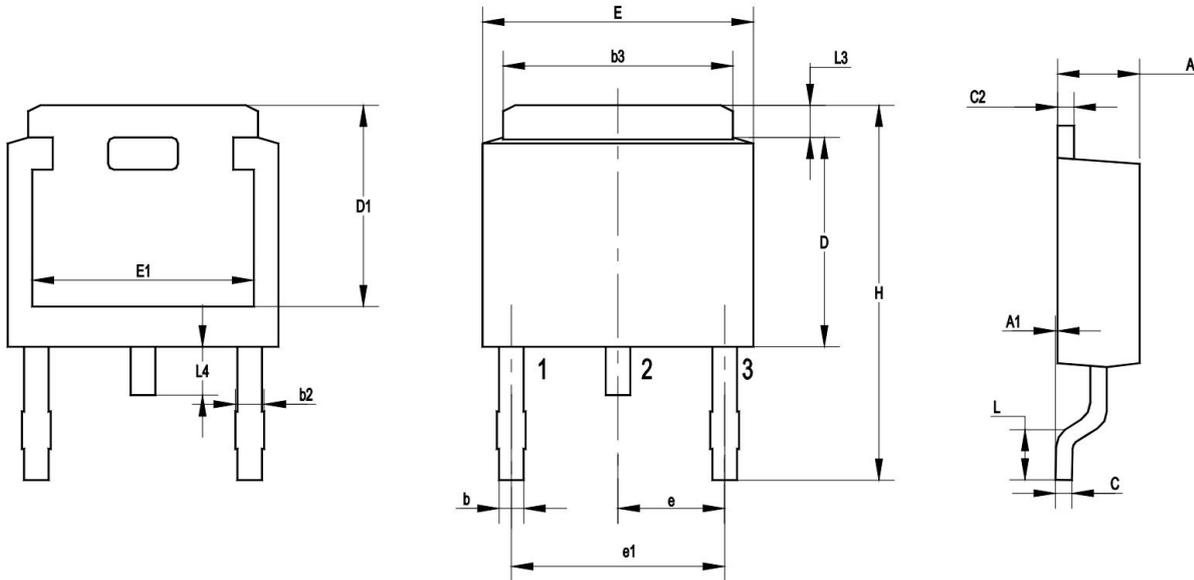


Fig.14 Normalized Maximum Transient Thermal Impedance( $Z_{\theta JA}$ )



### TO-252AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.100	2.500	0.083	0.098
A1	0.000	0.150	0.000	0.006
b	0.500	1.000	0.020	0.039
b2	0.650	1.150	0.026	0.045
b3	4.900	5.500	0.193	0.217
C	0.400	0.650	0.016	0.026
C2	0.400	0.650	0.016	0.026
D	5.600	6.200	0.220	0.244
D1	5.000	5.400	0.197	0.213
E	6.100	6.700	0.240	0.264
E1	4.600	5.000	0.181	0.197
e	2.300 TYP.		0.091 TYP.	
e1	4.600 TYP.		0.181 TYP.	
H	9.000	10.700	0.354	0.421
L	1.400	1.780	0.055	0.070
L3	0.850	1.200	0.033	0.047
L4	0.510	1.100	0.020	0.043