

## P-Channel 40 V (D-S) MOSFEET

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (Ω)(Typ.)	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)
- 40	0.0046 at V <sub>GS</sub> = - 10 V	- 95	139 nC
	0.0062 at V <sub>GS</sub> = - 4.5 V	- 82	

### FEATURES

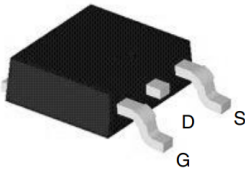
- DT-Trench Power MOSFET
- 100 % Rg and UIS Tested
- AEC-Q101 Qualified for Automotive Applications



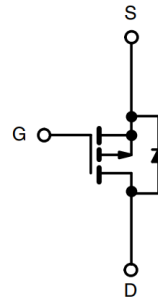
### APPLICATIONS

- Load Switch

TO-252 Pin Configuration



Top View



P-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub> = 25 °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V <sub>DS</sub>	- 40	V	
Gate-Source Voltage	V <sub>GS</sub>	± 20		
Continuous Drain Current (T <sub>J</sub> = 175 °C)	I <sub>D</sub>	T <sub>C</sub> = 25 °C	- 95 <sup>a</sup>	
		T <sub>C</sub> = 125 °C	- 63	
Pulsed Drain Current	I <sub>DM</sub>	- 360	A	
Avalanche Current	I <sub>AR</sub>	- 88		
Avalanche energy, single pulse <sup>a</sup>	L = 0.1 mH	E <sub>AS</sub>	75	mJ
Power Dissipation	P <sub>D</sub>	T <sub>C</sub> = 25 °C	135 <sup>a</sup>	W
		T <sub>A</sub> = 25 °C	6.3 <sup>b</sup>	
Operating Junction and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	- 55 to 175	°C	

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>b</sup>	R <sub>thJA</sub>	53	60	°C/W
Maximum Junction-to-Case	R <sub>thJC</sub>	0.81	0.9	

Notes:

a. Based on T<sub>C</sub> = 25 °C.

b. Surface mounted on 1" x 1" FR4 board.

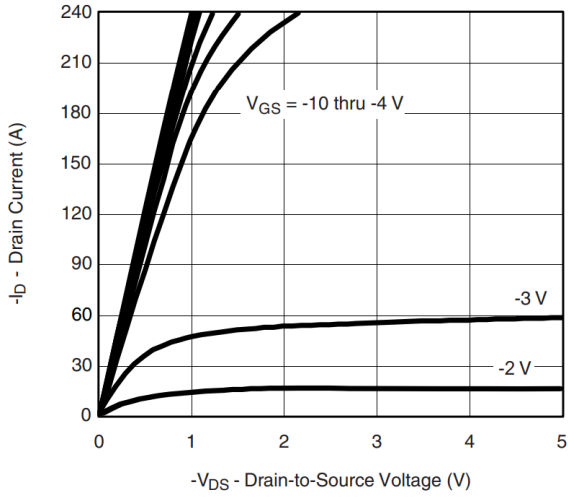
<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	- 40			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	- 1		- 3	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}$			- 1	$\mu\text{A}$
		$V_{DS} = -32\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			- 50	
		$V_{DS} = -32\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$			- 100	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	- 95			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -30\text{ A}$		0.0046	0.0059	$\Omega$
		$V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$		0.0062	0.0085	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -15\text{ V}, I_D = -30\text{ A}$		83		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = -20\text{ V}, f = 1\text{ MHz}$		6910		pF
Output Capacitance	$C_{oss}$			2082		
Reverse Transfer Capacitance	$C_{rss}$			162		
Total Gate Charge	$Q_g$	$V_{DS} = -20\text{ V}, V_{GS} = -10\text{ V}, I_D = -30\text{ A}$		139		nC
Gate-Source Charge	$Q_{gs}$			40		
Gate-Drain Charge	$Q_{gd}$			20		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -20\text{ V}, R_L = 0.6\text{ }\Omega$ $I_D \cong -30\text{ A}, V_{GEN} = -10\text{ V}, R_G = 6\text{ }\Omega$		25		ns
Rise Time	$t_r$			30		
Turn-Off Delay Time	$t_{d(off)}$			138		
Fall Time	$t_f$			55		
<b>Source-Drain Diode Ratings and Characteristics</b> $T_C = 25\text{ }^\circ\text{C}^b$						
Continuous Current	$I_S$				- 95	A
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = -1\text{ A}, V_{GS} = 0\text{ V}$		- 0.7	- 1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F = -10\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		59		ns
Reverse Recovery Charge	$Q_{rr}$	$I_F = -10\text{ A}, dI/dt = 100\text{ A}/\mu\text{s}$		82		nC

Notes:

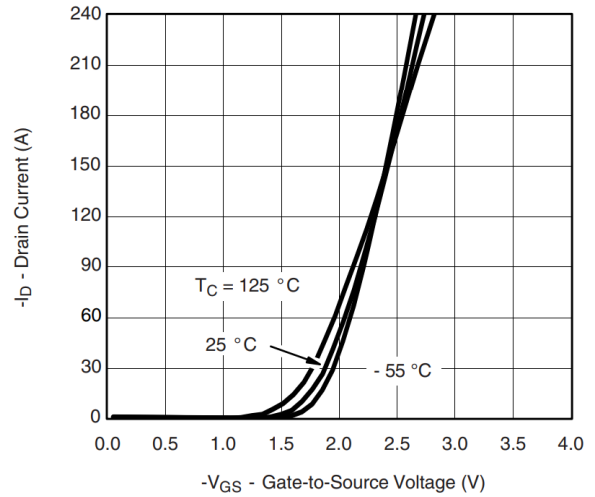
- a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

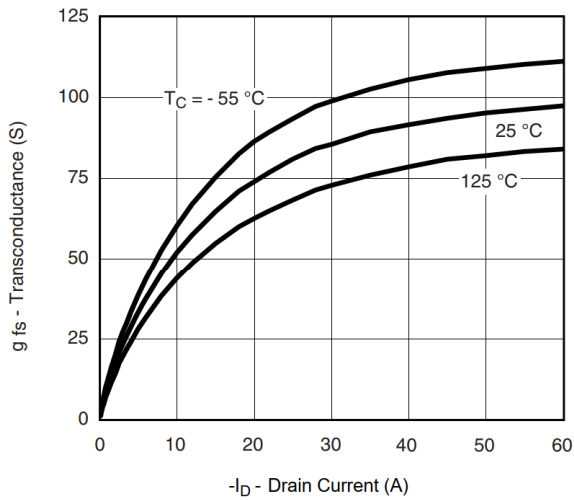
**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



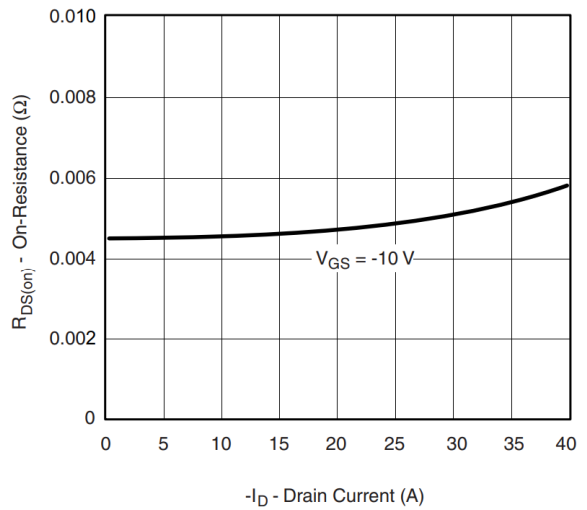
**Output Characteristics**



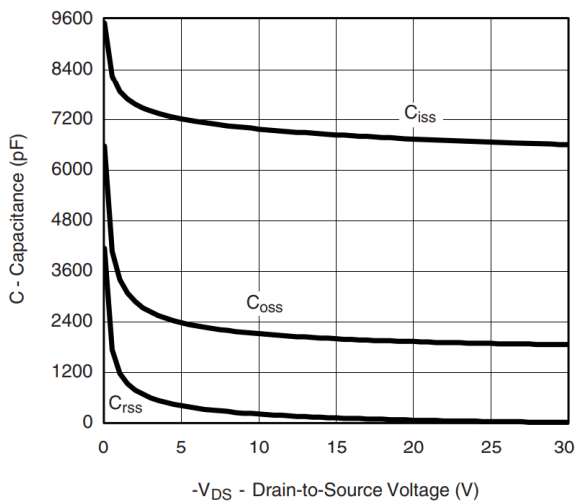
**Transfer Characteristics**



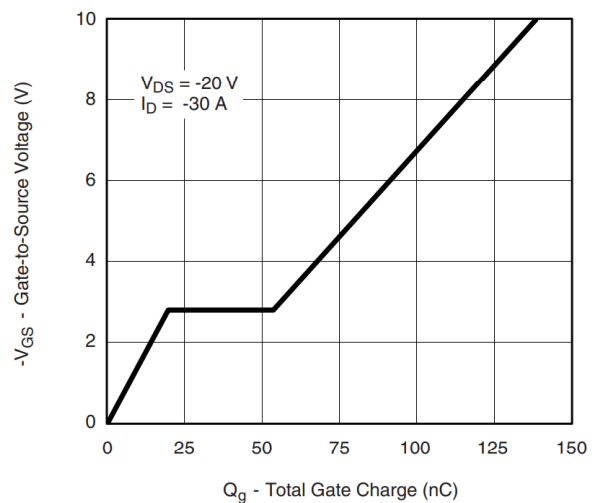
**Transconductance**



**On-Resistance vs. Drain Current**

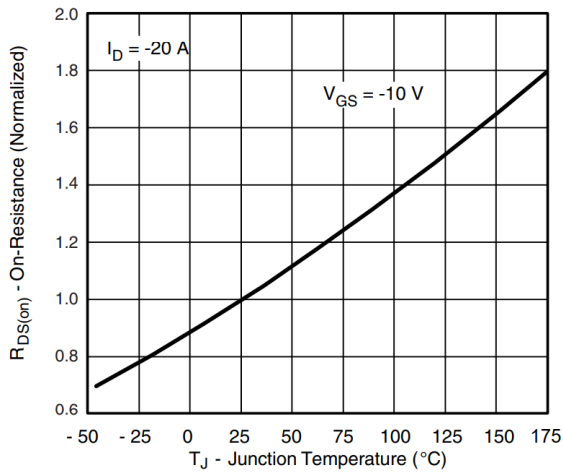


**Capacitance**

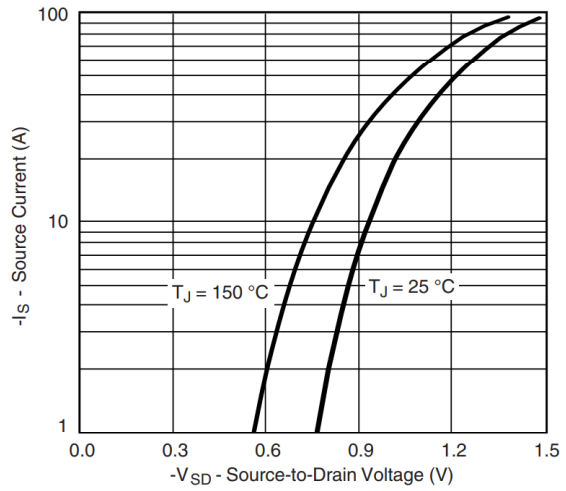


**Gate Charge**

**TYPICAL CHARACTERISTICS**

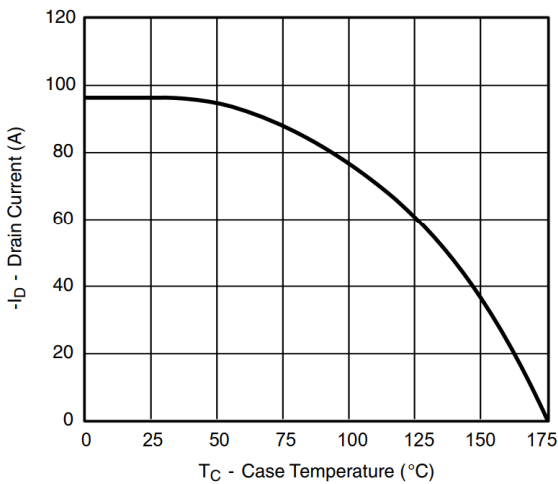


On-Resistance vs. Junction Temperature

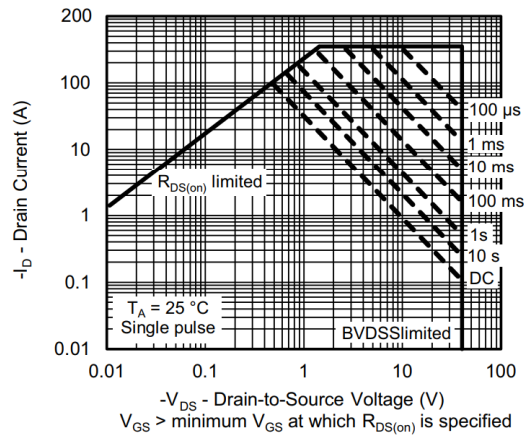


Source-Drain Diode Forward Voltage

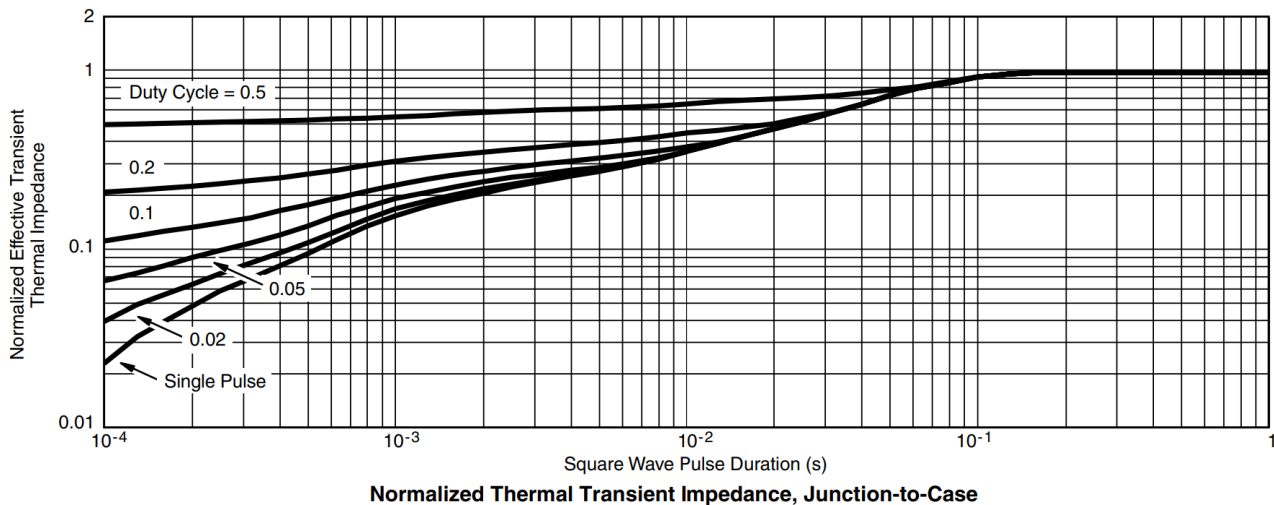
**THERMAL RATINGS (25 °C, unless otherwise noted)**



Drain Current vs. Case Temperature

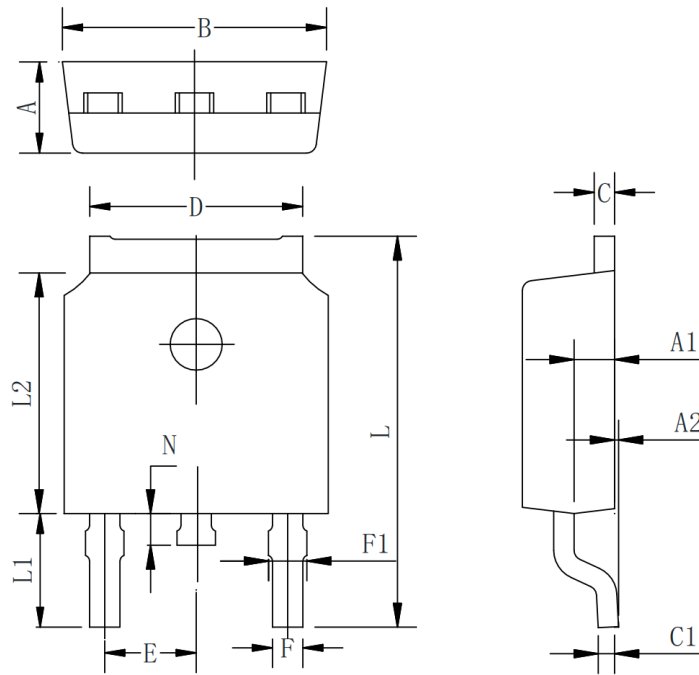


Safe Operating Area, Junction-to-Ambient



Normalized Thermal Transient Impedance, Junction-to-Case

## TO-252-2L PACKAGE OUTLINE



COMMON DIMENSIONS  
(UNITS OF MEASURE=MILLIMETER)

Symbol	Min	Typ	Max
A	2.10	2.30	2.50
A1	0.88	1.01	1.16
A2	0.00	0.15	0.28
B	6.40	6.60	6.80
C	0.42	0.50	0.63
C1	0.42	0.50	0.63
D	5.08	5.32	5.65
E	2.286 TYP		
F	0.63	0.76	0.89
F1	0.64	0.86	1.08
L	9.30	9.90	10.80
L1	2.4	2.8	3.6
L2	5.90	6.10	6.55
N	0.57	0.80	1.05

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