

P-Channel 40-V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)	Q_g (Typ.)
- 40	0.012 at $V_{GS} = - 10$ V	- 60 ^d	60
	0.018 at $V_{GS} = - 4.5$ V	- 48 ^d	

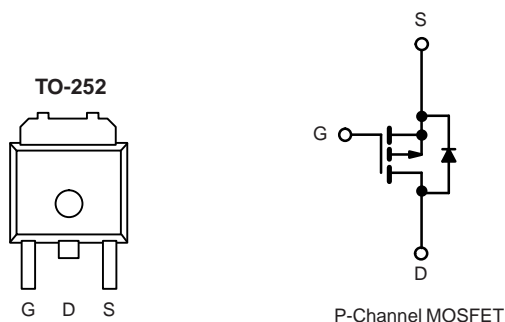
FEATURES

- DT-Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC


RoHS
 COMPLIANT

APPLICATIONS

- Power Switch
- Load Switch in High Current Applications
- DC/DC Converters



ABSOLUTE MAXIMUM RATINGS $T_C = 25\text{ }^\circ\text{C}$, unless otherwise noted

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	- 40	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150\text{ }^\circ\text{C}$)	I_D	$T_C = 25\text{ }^\circ\text{C}$ - 60 ^d	A
		$T_C = 70\text{ }^\circ\text{C}$ - 60 ^d	
Pulsed Drain Current	I_{DM}	- 180	
Avalanche Current	I_{AS}	- 46	
Single Avalanche Energy ^a	E_{AS}	106	mJ
Maximum Power Dissipation ^a	P_D	$T_C = 25\text{ }^\circ\text{C}$ 73.5 ^b	W
		$T_A = 25\text{ }^\circ\text{C}^c$ 2.5	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount) ^c	R_{thJA}	50	$^\circ\text{C}/\text{W}$
Junction-to-Case (Drain)	R_{thJC}	1.7	

Notes:

a. Duty cycle $\leq 1\%$.

b. See SOA curve for voltage derating.

c. When Mounted on 1" square PCB (FR-4 material).

d. Package limited.

SPECIFICATIONS T _J = 25 °C, unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{DS} = 0 V, I _D = - 250 μA	- 40			V
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = - 250 μA	- 1		- 2.5	
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			± 250	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = - 40 V, V _{GS} = 0 V			- 1	μA
		V _{DS} = - 40 V, V _{GS} = 0 V, T _J = 125 °C			- 50	
		V _{DS} = - 40 V, V _{GS} = 0 V, T _J = 150 °C			- 250	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≤ - 10 V, V _{GS} = - 10 V	- 50			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = - 10 V, I _D = - 22 A		0.010	0.012	Ω
		V _{GS} = - 4.5 V, I _D = - 19 A		0.015	0.018	
Forward Transconductance ^a	g _{fs}	V _{DS} = - 15 V, I _D = - 22 A		45		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = - 20 V, f = 1 MHz		5380		pF
Output Capacitance	C _{oss}			570		
Reverse Transfer Capacitance	C _{rss}			500		
Total Gate Charge ^c	Q _g	V _{DS} = - 20 V, V _{GS} = - 10 V, I _D = - 20 A		106	159	nC
Gate-Source Charge ^c	Q _{gs}	V _{DS} = - 20 V, V _{GS} = - 4.5 V, I _D = - 20 A		60	90	
Gate-Drain Charge ^c	Q _{gd}			22		
Gate Resistance	R _g	f = 1 MHz	0.4	1.8	3.6	Ω
Turn-On Delay Time ^c	t _{d(on)}	V _{DD} = - 20 V, R _L = 2 Ω I _D ≅ - 10 A, V _{GEN} = - 10 V, R _g = 1 Ω		15	23	ns
Rise Time ^c	t _r			12	18	
Turn-Off Delay Time ^c	t _{d(off)}			70	105	
Fall Time ^c	t _f			18	27	
Drain-Source Body Diode Ratings and Characteristics T _C = 25 °C ^b						
Continuous Current	I _S				- 60	A
Pulsed Current	I _{SM}				- 180	
Forward Voltage ^a	V _{SD}	I _F = - 10 A, V _{GS} = 0 V		- 0.8	- 1.5	V
Reverse Recovery Time	t _{rr}	I _F = - 10 A, dI/dt = 100 A/μs		35	53	ns
Peak Reverse Recovery Current	I _{RM(REC)}			- 2	- 3	A
Reverse Recovery Charge	Q _{rr}				33	50

Notes:

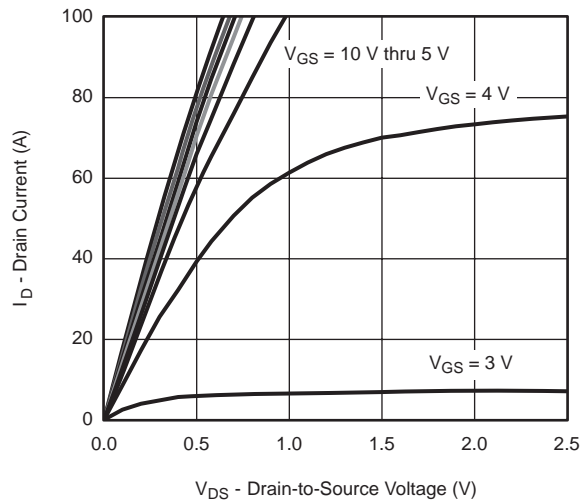
a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

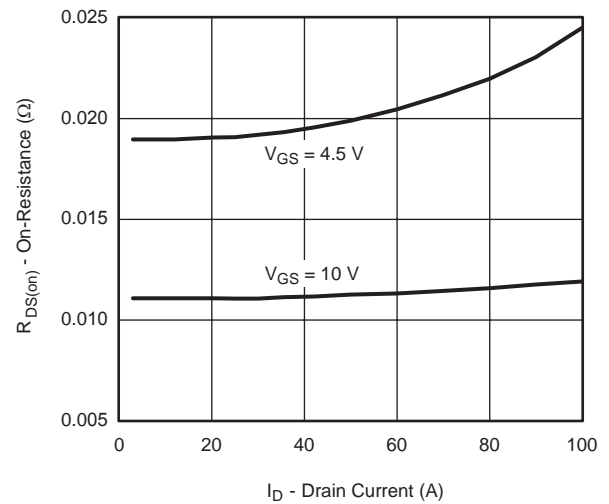
c. Independent of operating temperature.

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.

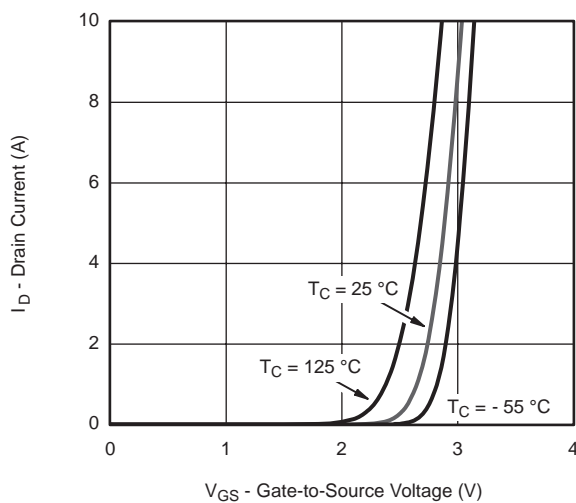
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



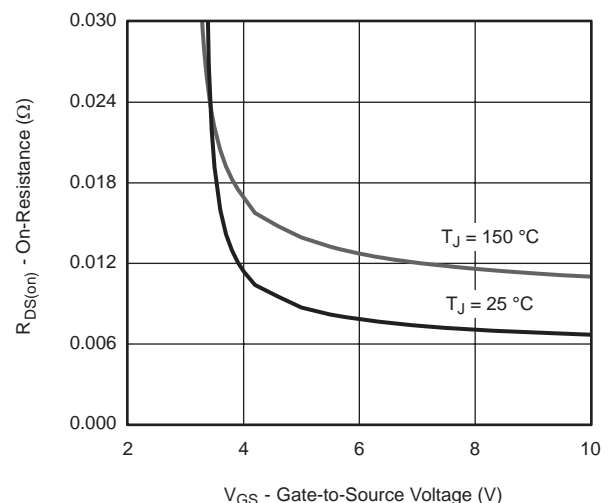
Output Characteristics



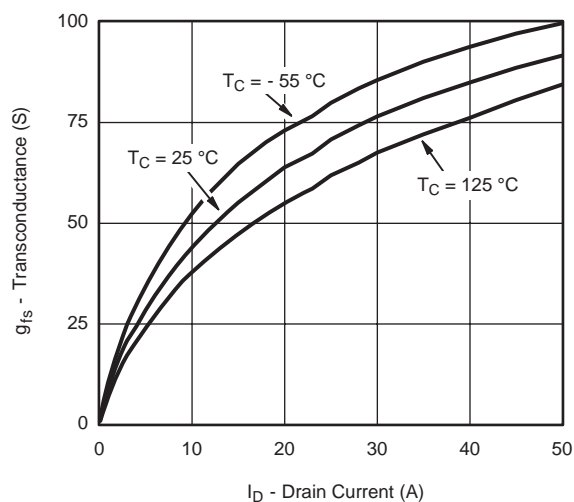
On-Resistance vs. Drain Current



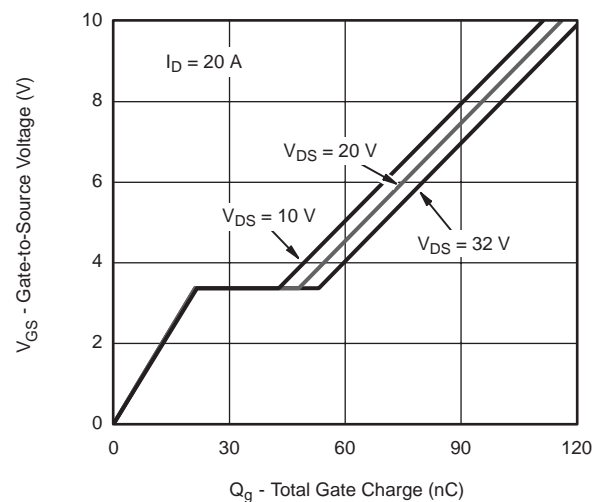
Transfer Characteristics



On-Resistance vs. Gate-to-Source Voltage

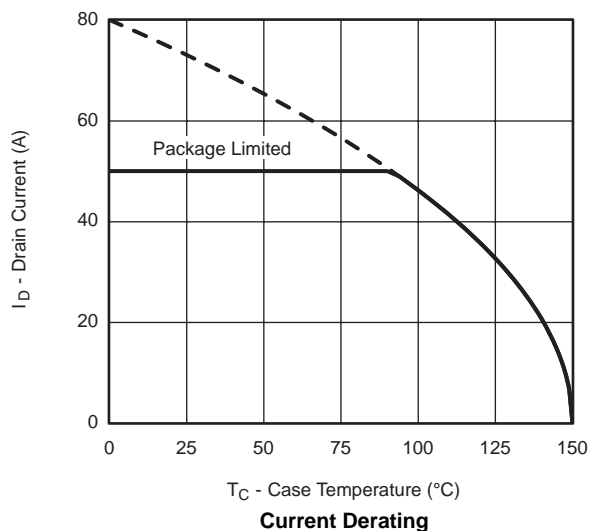
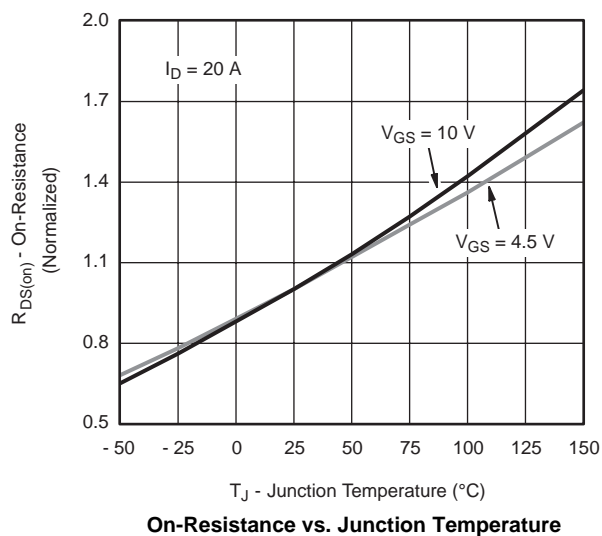
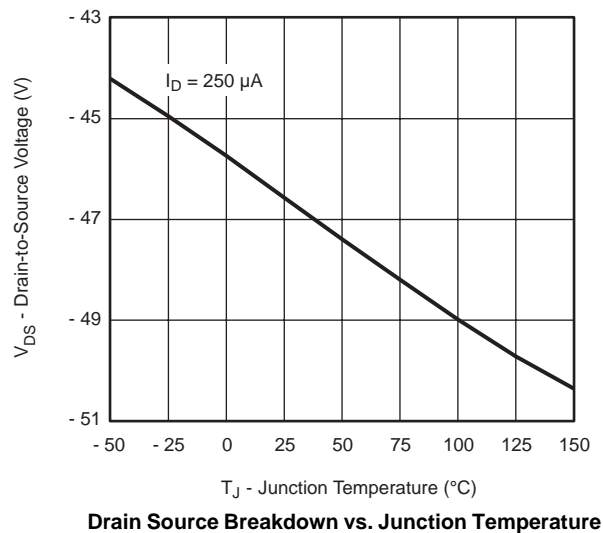
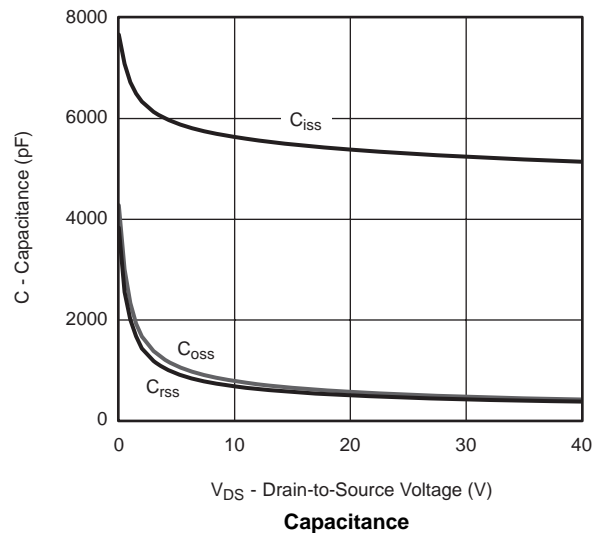
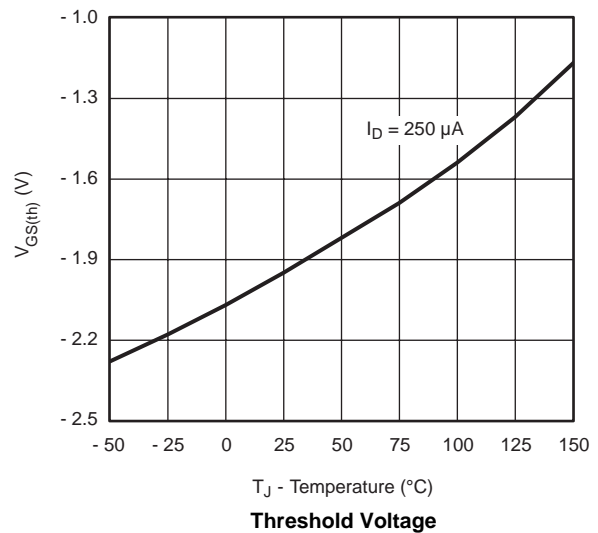
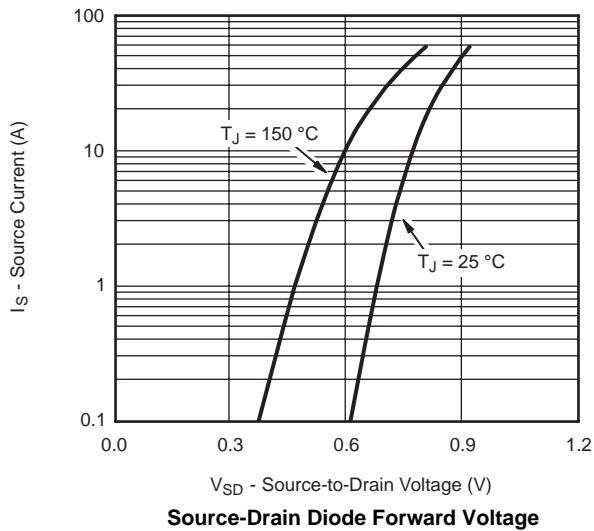


Transconductance

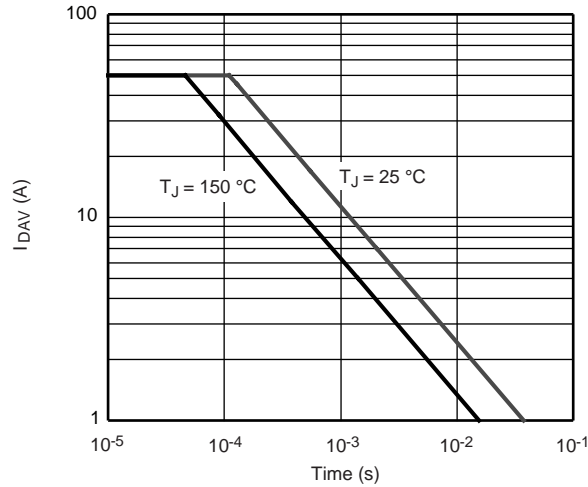


Gate Charge

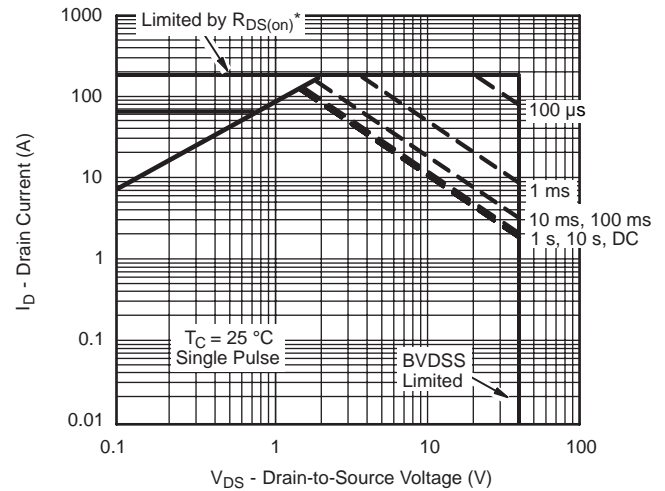
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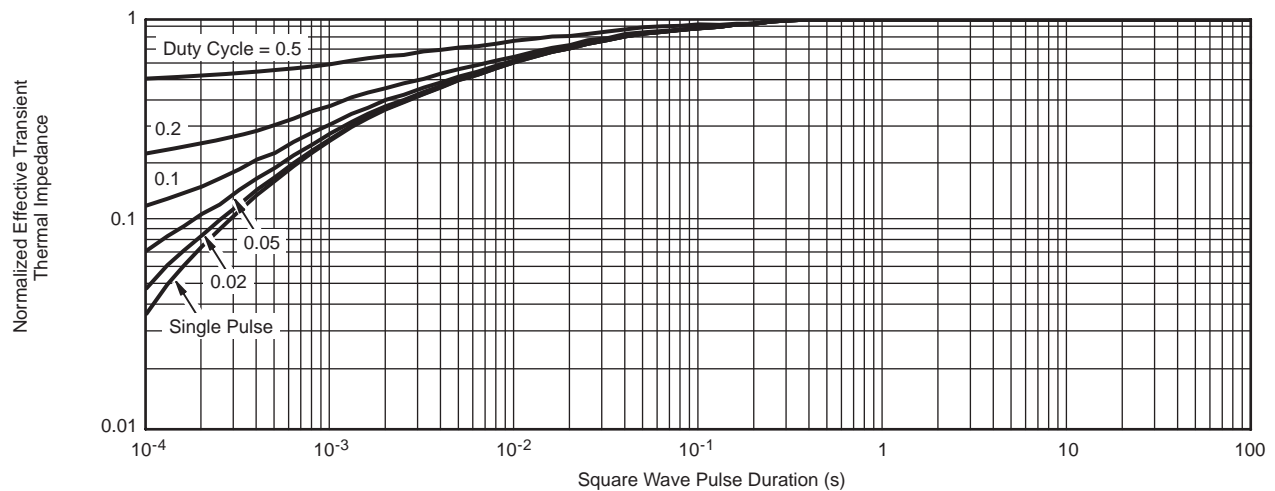


Single Pulse Avalanche Current Capability vs. Time



* $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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