

P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
- 60	0.0075 at V _{GS} = - 10 V	- 85	146 nC
	0.0095 at V _{GS} = - 4.5 V	- 72	

FEATURES

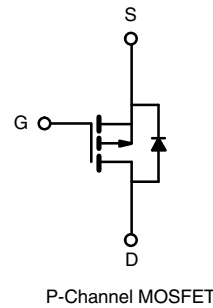
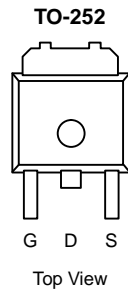
- DT-Trench Power MOSFET
- 100 % UIS Tested

APPLICATIONS

- Load Switch



RoHS
COMPLIANT



ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V _{DS}	- 60	V	
Gate-Source Voltage	V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	- 85 ^a	A
		T _C = 70 °C	- 46.8	
		T _A = 25 °C	- 14.3 ^b	
		T _A = 70 °C	- 12.1 ^b	
Pulsed Drain Current	I _{DM}	- 310		
Avalanche Current Pulse	I _{AS}	- 85	mJ	
Single Pulse Avalanche Energy				
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	79 ^a	A
		T _A = 25 °C	9.8 ^b	
Maximum Power Dissipation	P _D	T _C = 25 °C	134.2 ^a	W
		T _C = 70 °C	86.7 ^a	
		T _A = 25 °C	6.1 ^b	
		T _A = 70 °C	5 ^b	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^b	R _{thJA}	53	60	°C/W	
Maximum Junction-to-Case					

Notes:

a. Based on T_C = 25 °C.

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

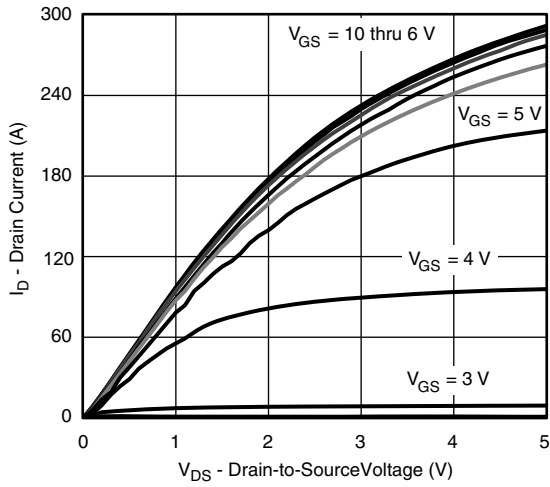
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T$	$I_D = -250\text{ }\mu\text{A}$		68		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-5.2		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1		-4	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	-280			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -30\text{ A}$		0.0075	0.0092	Ω
		$V_{GS} = -4.5\text{ V}, I_D = -20\text{ A}$		0.0095	0.0135	
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -50\text{ A}$	16			S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		8500		pF
Output Capacitance	C_{oss}			490		
Reverse Transfer Capacitance	C_{rss}			295		
Total Gate Charge	Q_g	$V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -55\text{ A}$		142	215	nC
				68	90	
Gate-Source Charge	Q_{gs}	$V_{DS} = -30\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -55\text{ A}$		16		
Gate-Drain Charge	Q_{gd}			23		
Gate Resistance	R_g	$f = 1\text{ MHz}$		5.2		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -2\text{ V}, R_L = 2\text{ }\Omega$ $I_D \equiv -10\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		70		ns
Rise Time	t_r			205		
Turn-Off Delay Time	$t_{d(off)}$			405		
Fall Time	t_f			186		
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-85	A
Pulse Diode Forward Current ^a	I_{SM}				-320	
Body Diode Voltage	V_{SD}	$I_S = -30\text{ A}$		-1	-1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -50\text{ A}, di/dt = 100\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		95	188	ns
Body Diode Reverse Recovery Charge	Q_{rr}			59	120	nC
Reverse Recovery Fall Time	t_a			29		ns
Reverse Recovery Rise Time	t_b			16		

Notes:

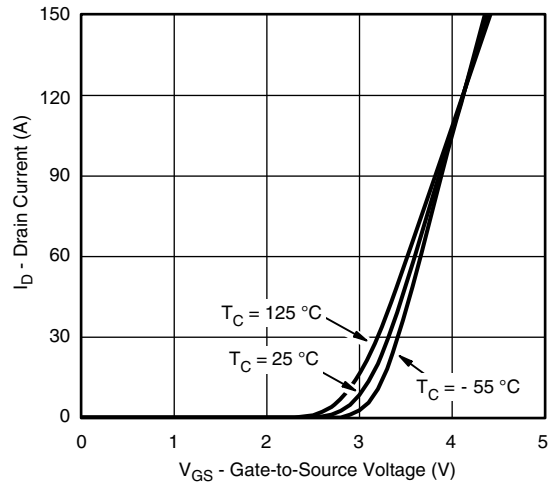
- Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
- Guaranteed by design, not subject to production testing.

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.

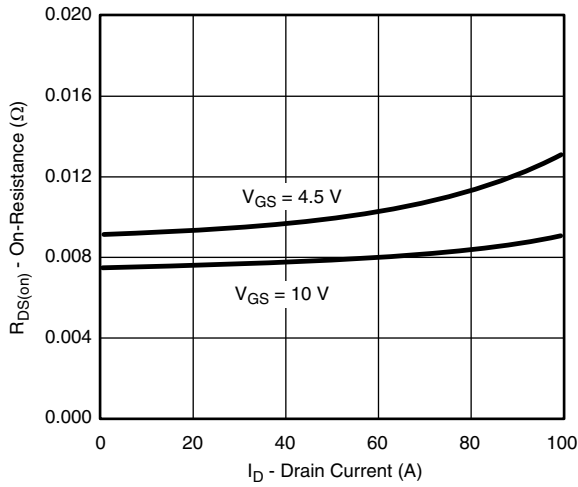
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



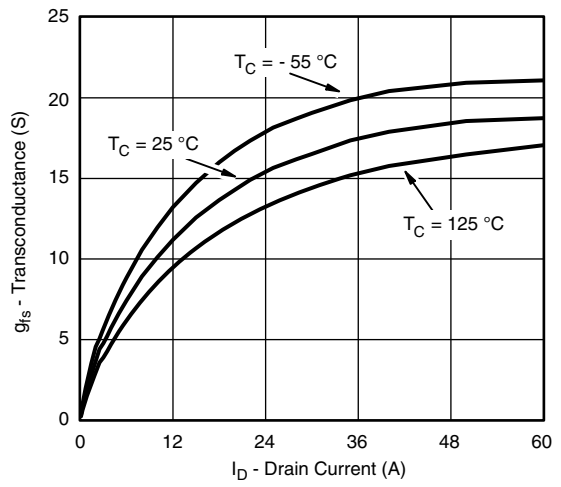
Output Characteristics



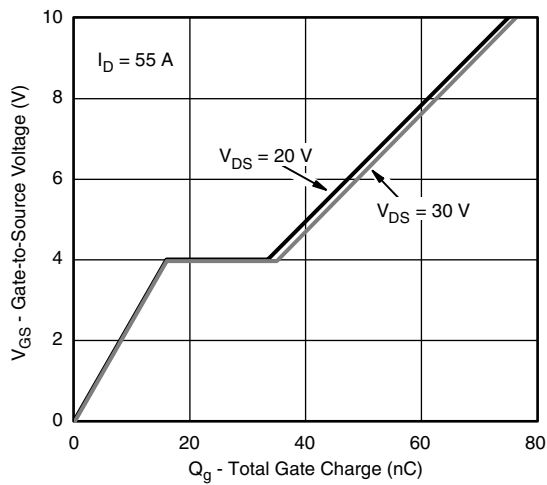
Transfer Characteristics



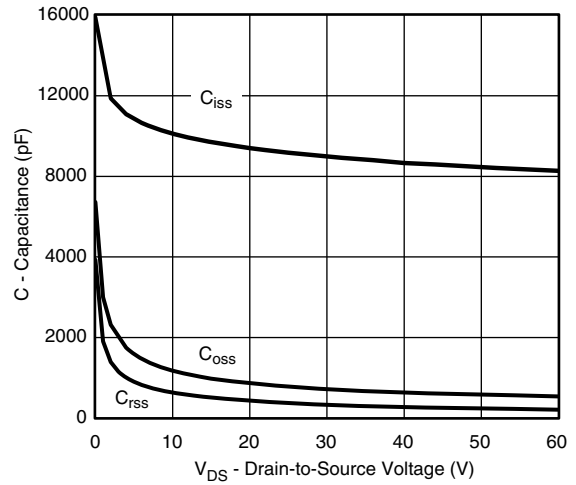
On-Resistance vs. Drain Current



Transconductance

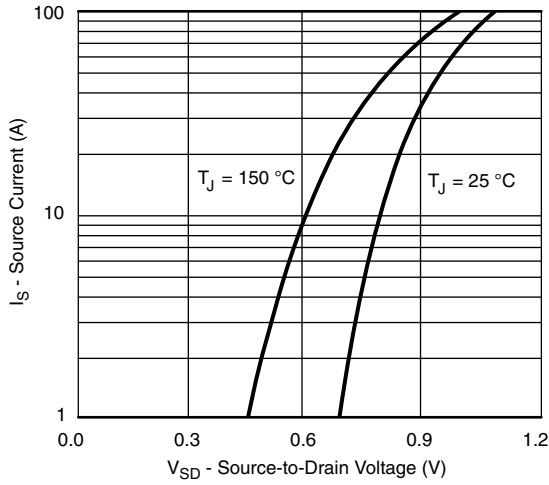


Gate Charge

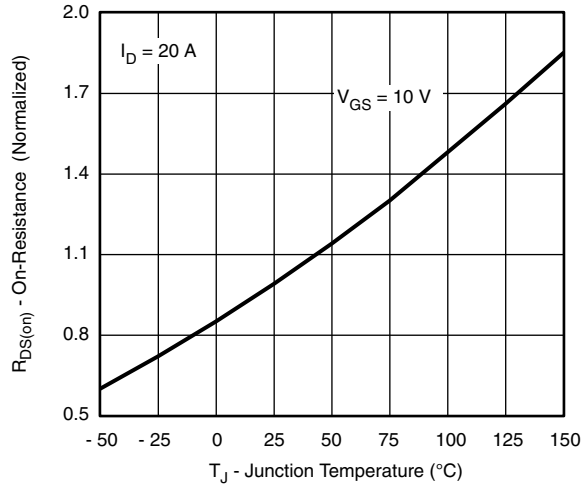


Capacitance

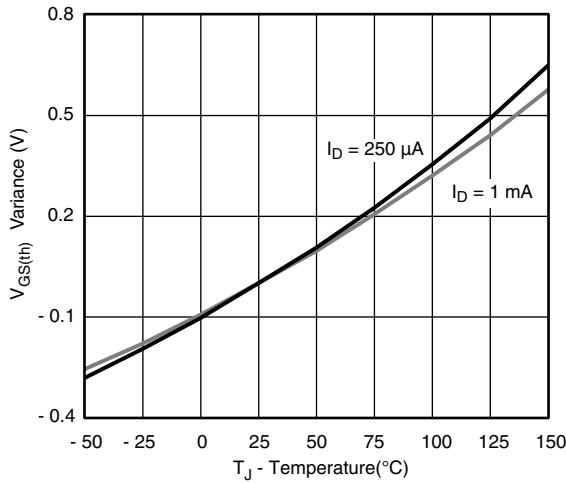
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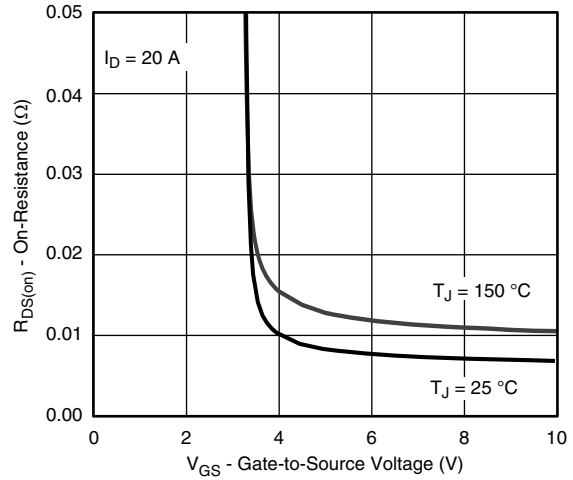
Source-Drain Diode Forward Voltage



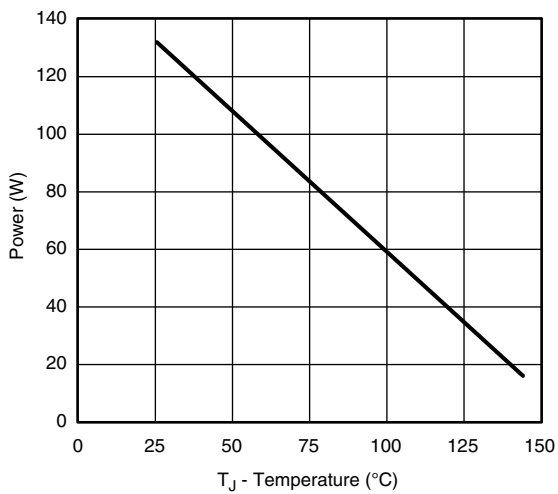
On-Resistance vs. Gate-to-Source Voltage



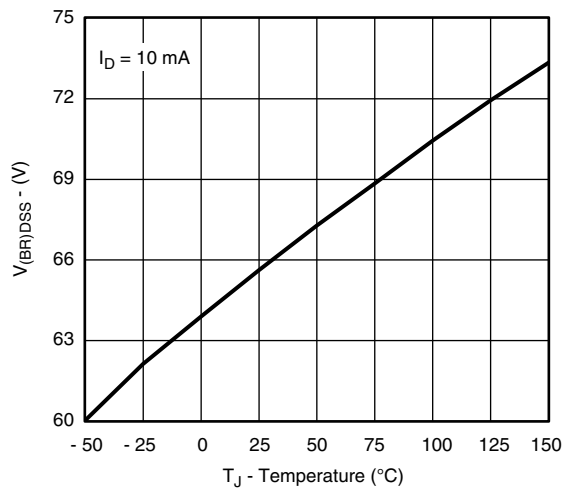
Threshold Voltage



On-Resistance vs. Gate-to-Source Voltage

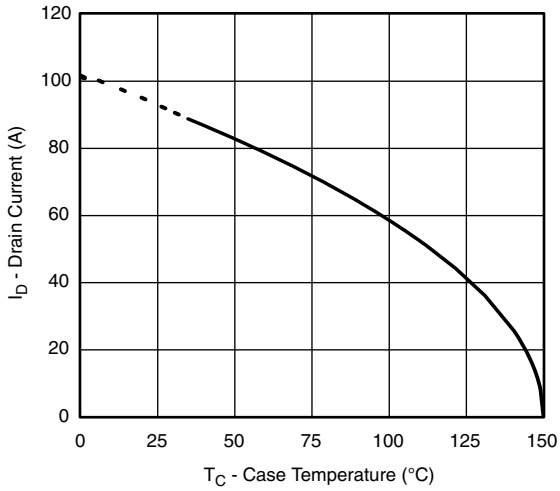


Power Derating, Junction-to-Case

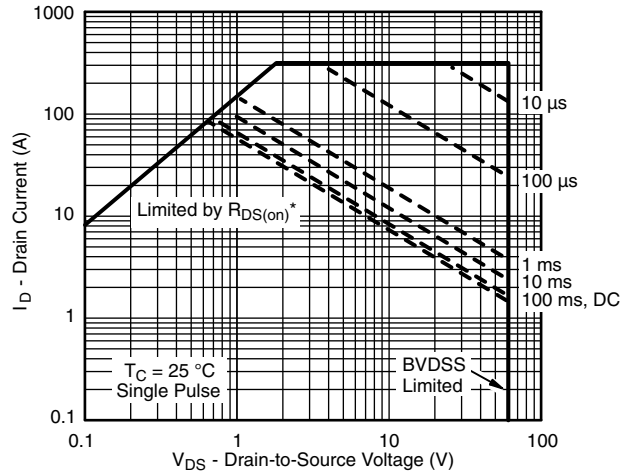


Drain-Source Breakdown Voltage vs. Junction Temperature

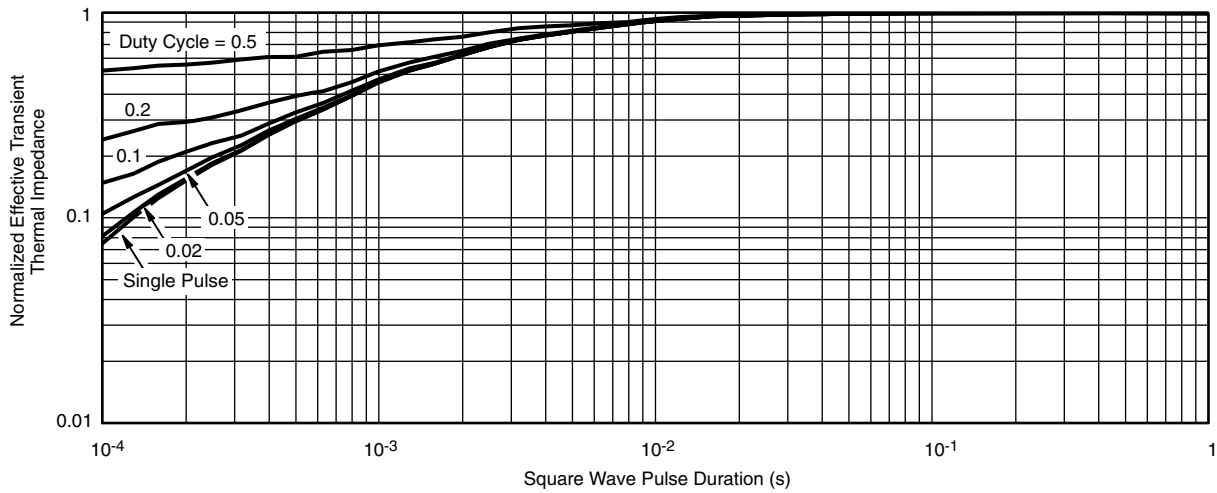
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Max. Drain Current vs. Case Temperature



Safe Operating Area, Junction-to-Case
* V_{GS} > minimum V_{GS} at which R_{DS(on)} is specified



Normalized Thermal Transient Impedance, Junction-to-Case

TO-252AA CASE OUTLINE



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.92	2.58	0.076	0.112
A1	-	0.127	-	0.005
b	0.64	0.88	0.025	0.035
b2	0.76	1.14	0.030	0.045
b3	4.95	5.46	0.195	0.215
C	0.32	0.65	0.023	0.026
C2	0.46	0.89	0.018	0.035
D	5.70	6.50	0.224	0.256
D1	4.21	-	0.166	-
E	6.05	6.95	0.238	0.274
E1	4.32	-	0.170	-
H	9.00	10.41	0.350	0.417
e	2.28 BSC		0.090 BSC	
e1	4.56 BSC		0.180 BSC	
L	1.40	1.78	0.055	0.070
L3	0.89	1.27	0.035	0.050
L4	-	1.02	-	0.040
L5	1.14	1.52	0.045	0.060
ECN: X12-0247-Rev. M, 24-Dec-12 DWG: 5347				

Note

- Dimension L3 is for reference only.

RECOMMENDED MINIMUM PADS FOR DPAK (TO-252)



Recommended Minimum Pads
Dimensions in Inches/(mm)

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