P-Channel 40 V (D-S) MOSFET

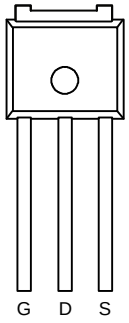
PRODUCT SUMMARY		
V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]
- 40	0.010 at V_{GS} = - 10 V	± 55
	0.014 at V_{GS} = - 4.5 V	± 54

FEATURES

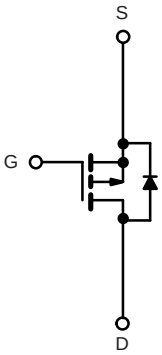
- Compliant to RoHS Directive 2002/95/EC

Available
RoHS* COMPLIANT

TO-251



Top View



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Gate-Source Voltage		V_{GS}	± 40	V
Continuous Drain Current (T_J = 175 °C)	T_C = 25 °C	I_D	- 55[a]	A
	T_C = 125 °C		- 52	
Pulsed Drain Current		I_{DM}	- 220	
Avalanche Current		I_{AR}	- 60	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	180	mJ
Power Dissipation	T_C = 25 °C	P_D	45	W
	T_A = 25 °C		3.75	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

THERMAL RESISTANCE RATINGS				
Parameter		**Symbol**	**Limit**	**Unit**
Junction-to-Ambient	PCB Mount (TO-263)[c]	R_{thJA}	40	°C/W
	Free Air (TO-220AB)		62.5	
Junction-to-Case		R_{thJC}	0.8	

Notes:
a. Package limited.
b. Duty cycle ≤ 1 %.
c. When mounted on 1" square PCB (FR-4 material).
d. See SOA curve for voltage derating.

* Pb containing terminations are not RoHS compliant, exemptions may apply.

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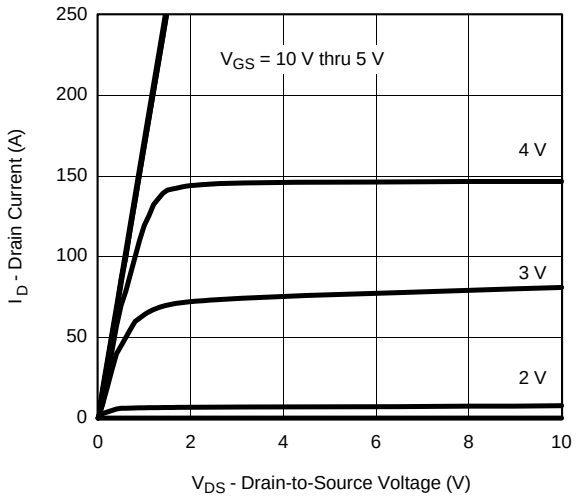
SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	V_{GS} = 0 V, I_D = - 250 µA	- 40			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 1.0		- 2.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	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 = 175 °C			- 250	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = - 5 V, V_{GS} = - 10 V	- 120			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V, I_D = - 30 A		0.010		Ω
		V_{GS} = - 10 V, I_D = - 30 A, T_J = 125 °C		0.016		
		V_{GS} = - 10 V, I_D = - 30 A, T_J = 175 °C		0.023		
		V_{GS} = - 4.5 V, I_D = - 20 A		0.014		
Forward Transconductance[a]	g_{fs}	V_{DS} = - 15 V, I_D = - 75 A	20			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = - 25 V, f = 1 MHz		3000		pF
Output Capacitance	C_{oss}			620		
Reversen Transfer Capacitance	C_{rss}			315		
Total Gate Charge[c]	Q_g	V_{DS} = - 15 V, V_{GS} = - 10 V, I_D = - 75 A		160		nC
Gate-Source Charge[c]	Q_{gs}			32		
Gate-Drain Charge[c]	Q_{gd}			30		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = - 15 V, R_L = 0.2 Ω $I_D \cong$ - 75 A, V_{GEN} = - 10 V, R_g = 2.5 Ω		25	40	ns
Rise Time[c]	t_r			225	360	
Turn-Off Delay Time[c]	$t_{d(off)}$			150	240	
Fall Time[c]	t_f			210	340	
Source-Drain Diode Ratings and Characteristics[b] (T_C = 25 °C)						
Continuous Current	I_S			- 220		A
Pulsed Current	I_{SM}				- 240	
Forward Voltage[a]	V_{SD}	I_F = - 75 A, V_{GS} = 0 V		- 1.2	- 1.5	V
Reverse Recovery Time	t_{rr}	I_F = - 75 A, dI/dt = 100 A/µs		55	100	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			2.5	5	A
Reverse Recovery Charge	Q_{rr}			0.07	0.25	µC

Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

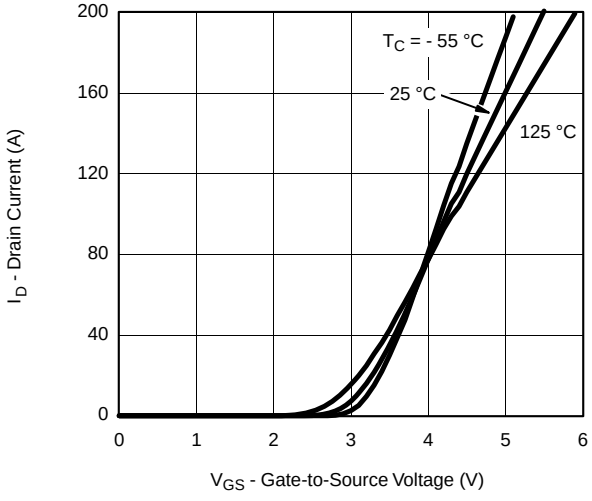
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

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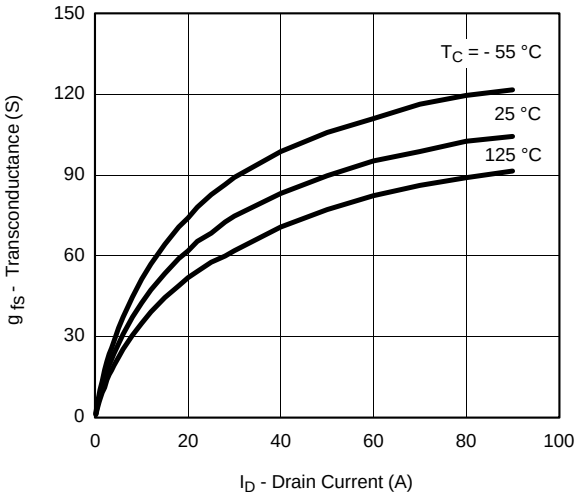
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



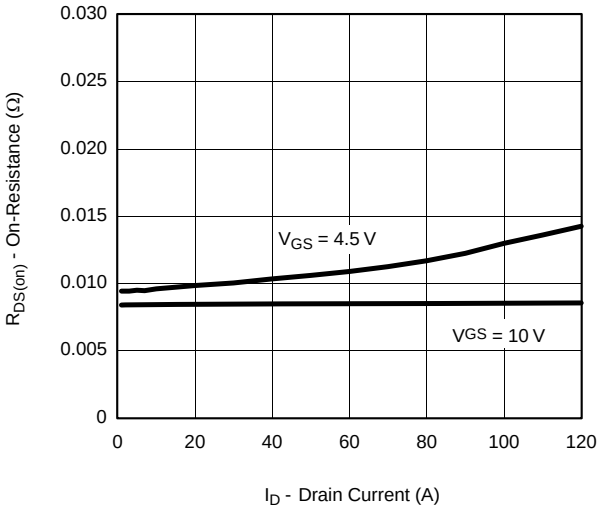
Output Characteristics



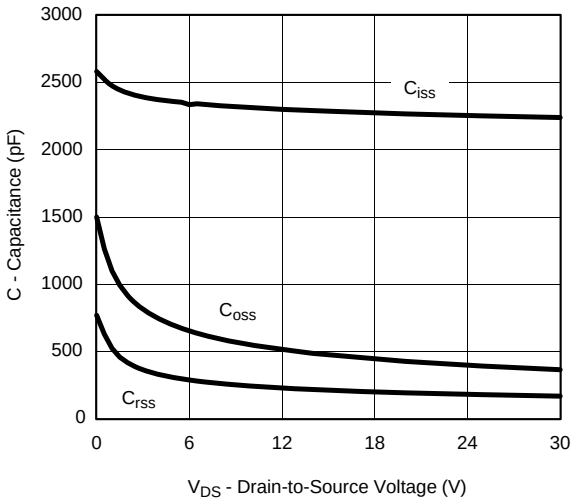
Transfer Characteristics



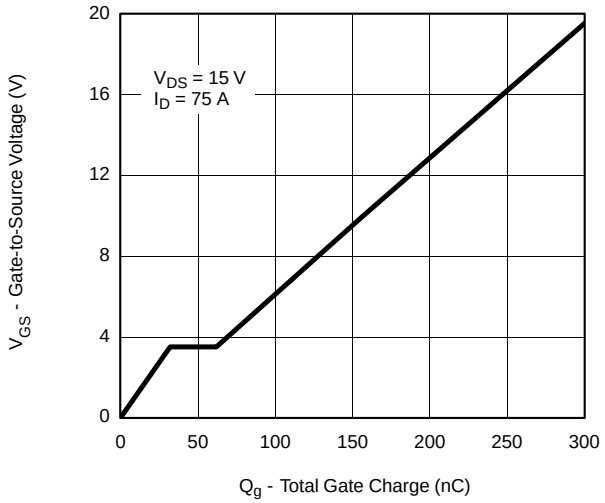
Transconductance



On-Resistance vs. Drain Current



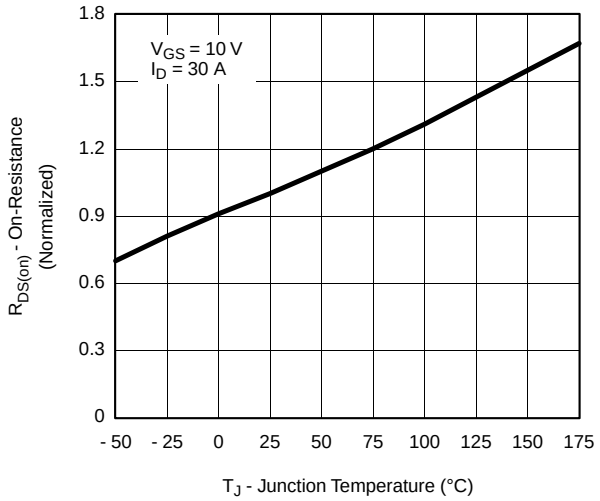
Capacitance



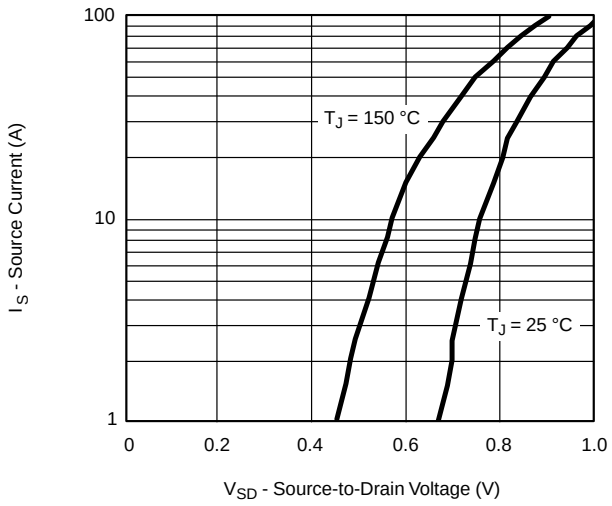
Gate Charge

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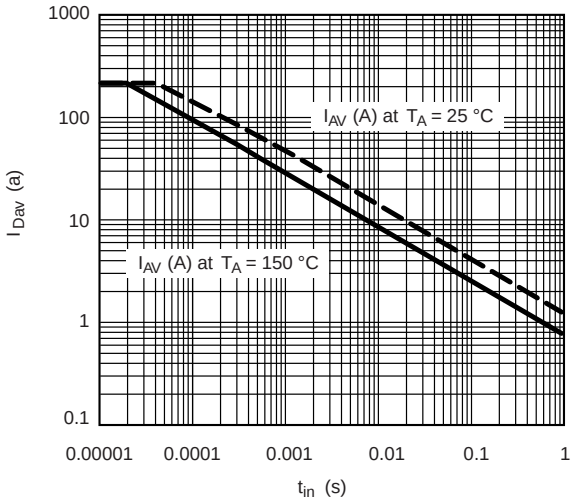
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



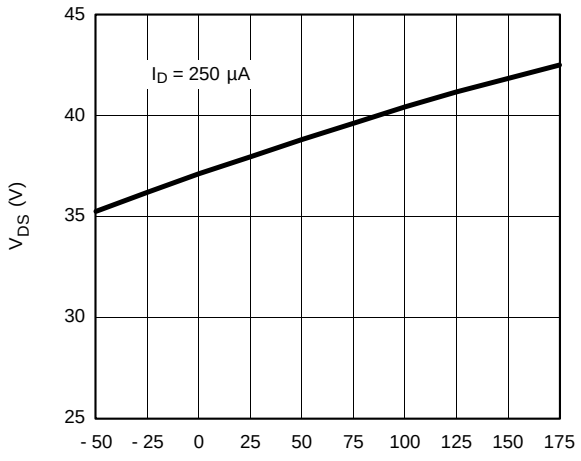
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage



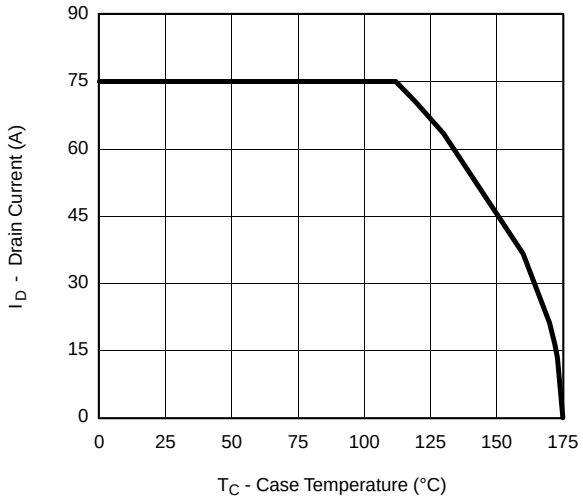
Avalanche Current vs. Time



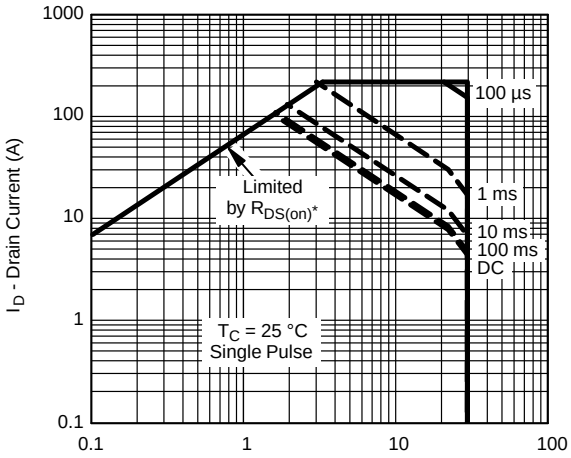
Drain Source Breakdown vs. Junction Temperature

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THERMAL RATINGS

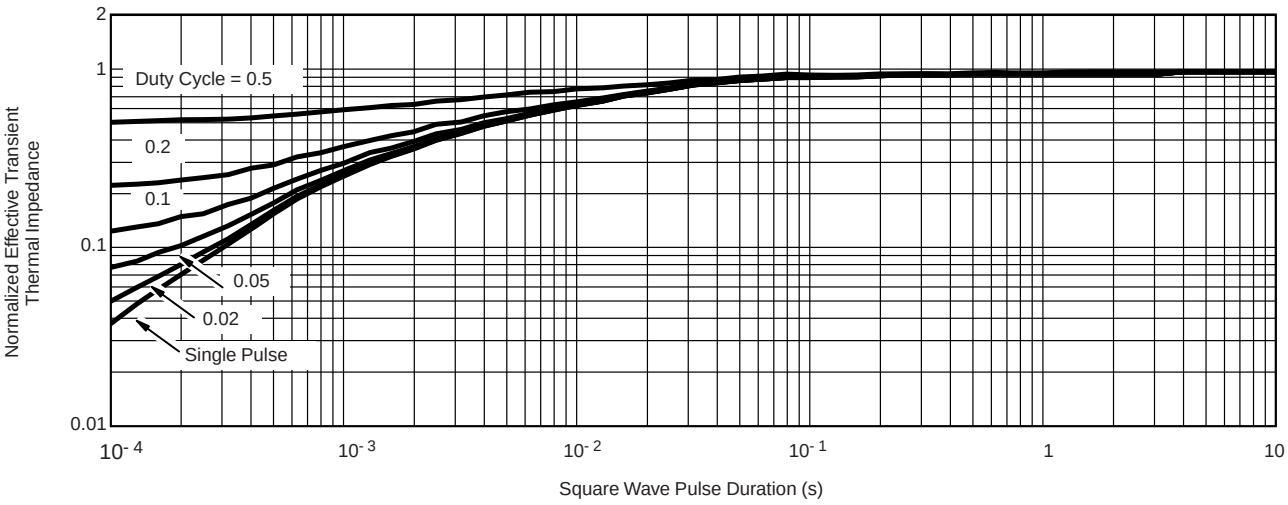


Maximum Avalanche and Drain Current vs. Case Temperature



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

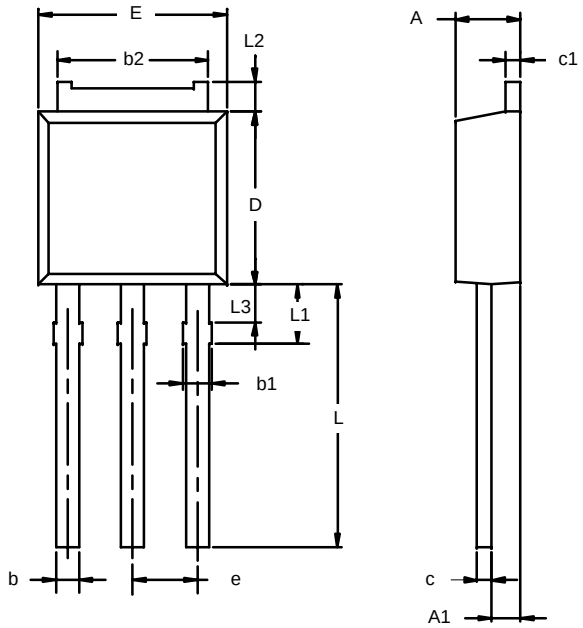
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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TO-251AA (DPAK)



Note: Dimension L3 is for reference only.

Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	2.21	2.38	0.087	0.094
A1	0.89	1.14	0.035	0.045
b	0.71	0.89	0.028	0.035
b1	0.76	1.14	0.030	0.045
b2	5.23	5.43	0.206	0.214
c	0.46	0.58	0.018	0.023
c1	0.46	0.58	0.018	0.023
D	5.97	6.22	0.235	0.245
E	6.48	6.73	0.255	0.265
e	2.28 BSC		0.090 BSC	
L	8.89	9.53	0.350	0.375
L1	1.91	2.28	0.075	0.090
L2	0.89	1.27	0.035	0.050
L3	1.15	1.52	0.045	0.060
ECN: S-03946—Rev. E, 09-Jul-01 DWG: 5346				

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