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P-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A)[a]
- 30	0.009 at V_{GS} = - 10 V	± 80
	0.012 at V_{GS} = - 4.5 V	± 80

FEATURES

• Compliant to RoHS Directive 2002/95/EC

Pb Available

RoHS*
COMPLIANT

TO-252

Top View

S

G

D

P-Channel MOSFET
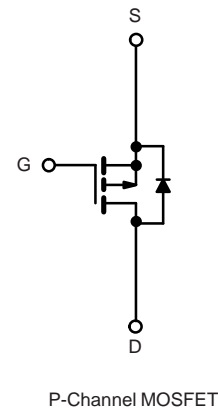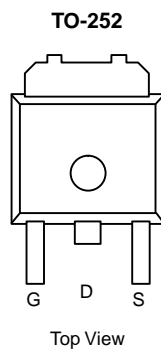
ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)

Parameter		Symbol	Limit	Unit
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current (T_J = 175 °C)	T_C = 25 °C	I_D	- 80[a]	A
	T_C = 125 °C		- 65	
Pulsed Drain Current		I_{DM}	- 240	
Avalanche Current		I_{AR}	- 60	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	180	mJ
Power Dissipation	T_C = 25 °C (TO-220AB and TO-263)	P_D	187[d]	W
	T_A = 25 °C (TO-263)[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	- 30			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = - 250 µA	- 1		- 3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 30 V, V_{GS} = 0 V			- 1	µA
		V_{DS} = - 30 V, V_{GS} = 0 V, T_J = 125 °C			- 50	
		V_{DS} = - 30 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		0.009		Ω
		V_{GS} = - 10 V, I_D = - 30 A, T_J = 125 °C			0.011	
		V_{GS} = - 10 V, I_D = - 30 A, T_J = 175 °C			0.013	
		V_{GS} = - 4.5 V, I_D = - 20 A		0.008	0.009	
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		9000		pF
Output Capacitance	C_{oss}			1565		
Reversen Transfer Capacitance	C_{rss}			715		
Total Gate Charge[c]	Q_g	V_{DS} = - 15 V, V_{GS} = - 10 V, I_D = - 75 A		160	240	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 ≅ - 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				- 80	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.

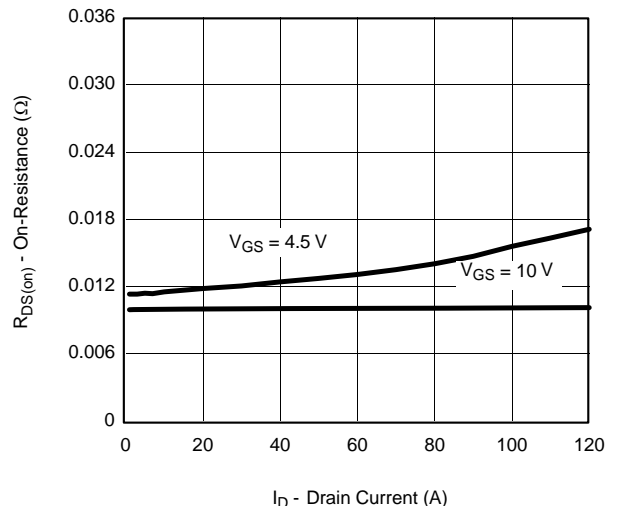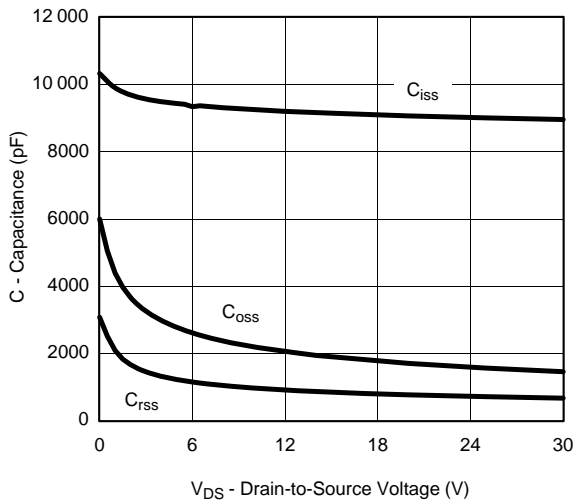## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

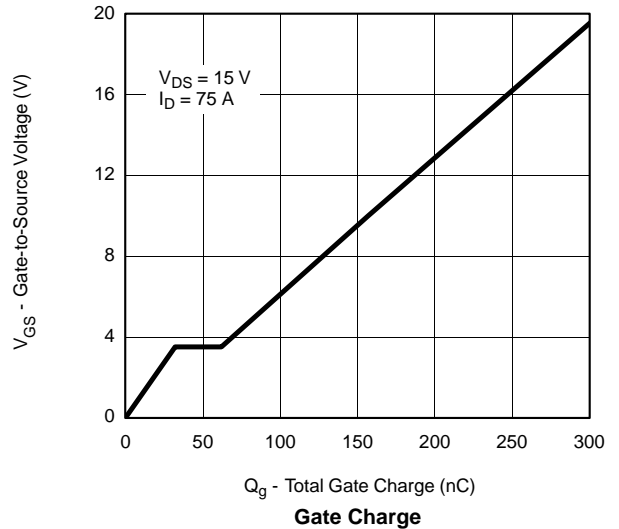**Output Characteristics**
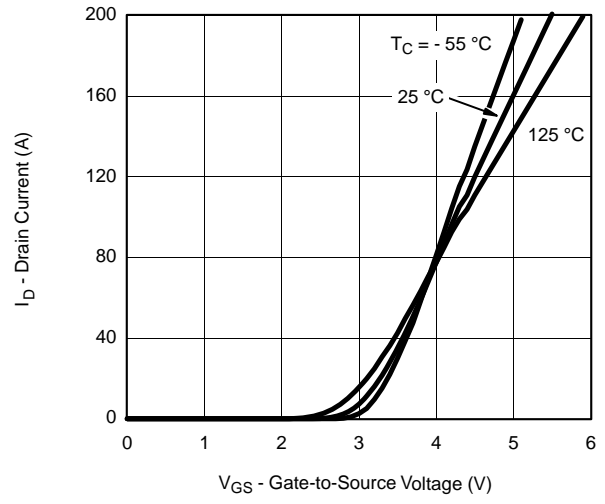
Transfer Characteristics

Transconductance

On-Resistance vs. Drain Current

Capacitance

Gate Charge

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

V_{GS} = 10 V
$R_{DS(on)}$ - On-Resistance (Normalized)
I_D = 30 A

T_J - Junction Temperature (°C)

On-Resistance vs. Junction Temperature

I_S - Source Current (A)

T_J = 150 °C

T_J = 25 °C

V_{SD} - Source-to-Drain Voltage (V)
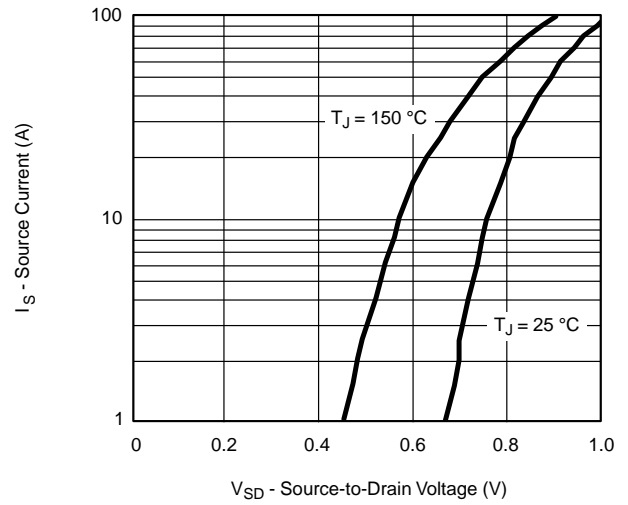
Source-Drain Diode Forward Voltage

I_{Dav} (a)

I_{AV} (A) at T_A = 25 °C

I_{AV} (A) at T_A = 150 °C

t_{in} (s)
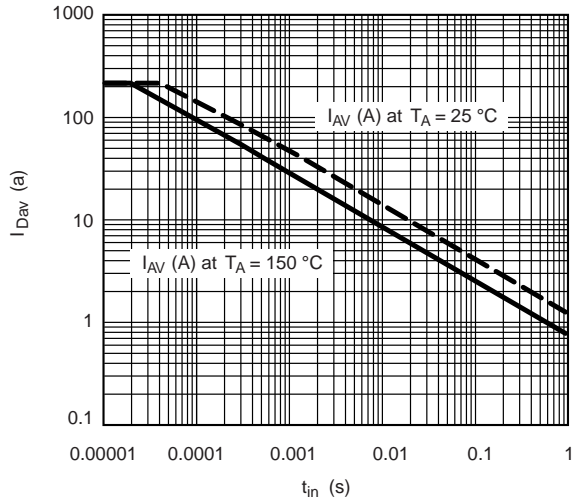
Avalanche Current vs. Time

V_{DS} (V)

I_D = 250 µA

T_J - Junction Temperature (°C)
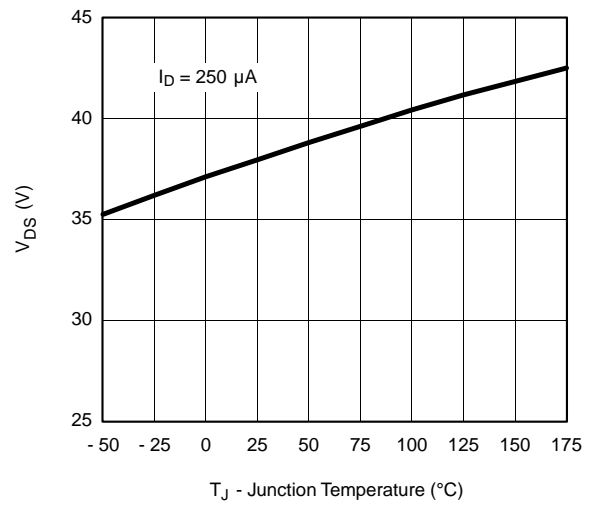
**Drain Source Breakdown
vs. Junction Temperature**

THERMAL RATINGS

**Maximum Avalanche and Drain Current
vs. Case Temperature**

Limited by $R_{DS(on)}$*

T_C = 25 °C
Single Pulse

100 µs
1 ms
10 ms
100 ms
DC
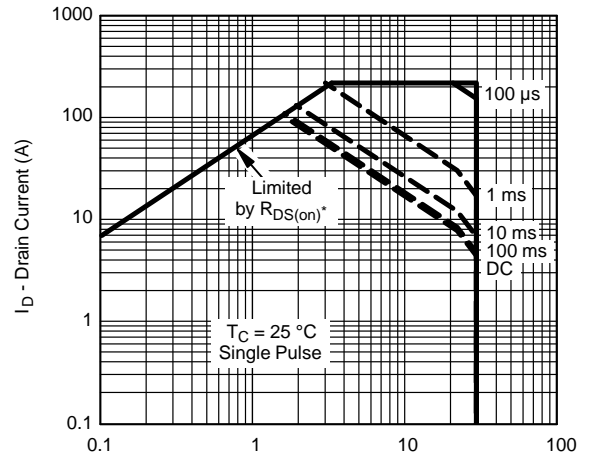
* V_{GS} > minimum V_{GS} at which $R_{DS(on)}$ is specified
Safe Operating Area

Duty Cycle = 0.5
0.2
0.1
0.05
0.02
Single Pulse

Square Wave Pulse Duration (s)
Normalized Thermal Transient Impedance, Junction-to-Case

TO-252AA CASE OUTLINE

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.38	0.086	0.094
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	0.46	0.61	0.018	0.024
C2	0.46	0.89	0.018	0.035
D	5.97	6.22	0.235	0.245
D1	5.21	-	0.205	-
E	6.35	6.73	0.250	0.265
E1	4.32	-	0.170	-
H	9.40	10.41	0.370	0.410
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)

0.224
(5.690)

0.243
(6.180)

0.420
(10.668)

0.087
(2.202)

0.090
(2.286)

0.180
(4.572)

0.055
(1.397)

Recommended Minimum Pads
Dimensions in Inches/(mm)

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