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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	0.005 at V_{GS} = - 10 V	-110
	0.007 at V_{GS} = - 4.5 V	-90

FEATURES

• Compliant to RoHS Directive 2002/95/EC

Pb Available

RoHS*
COMPLIANT

TO-252

Top View
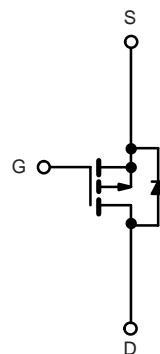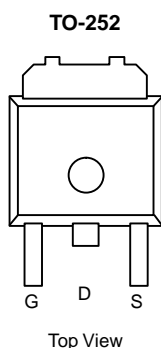
P-Channel MOSFET

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	-110 [a]	A
	T_C = 125 °C		- 90	
Pulsed Drain Current		I_{DM}	- 280	
Avalanche Current		I_{AR}	- 80	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	180	mJ
Power Dissipation	T_C = 25 °C	P_D	187	W
	T_A = 25 °C		105	
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	R_{thJA}	40	°C/W
	Free Air		62.5	
Junction-to-Case		R_{thJC}	0.8	

Notes:

a. Package limited.

b. Duty cycle $\leq$ 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.

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		0.005		Ω
		V_{GS} = - 10 V, I_D = - 30 A, T_J = 125 °C		0.007		
		V_{GS} = - 10 V, I_D = - 30 A, T_J = 175 °C		0.008		
		V_{GS} = - 4.5 V, I_D = - 20 A		0.007		
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		8000		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			24	nC
Gate-Source Charge[c]	Q_{gs}				20	
Gate-Drain Charge[c]	Q_{gd}				13	
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				- 110	A
Pulsed Current	I_{SM}				- 110	
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.

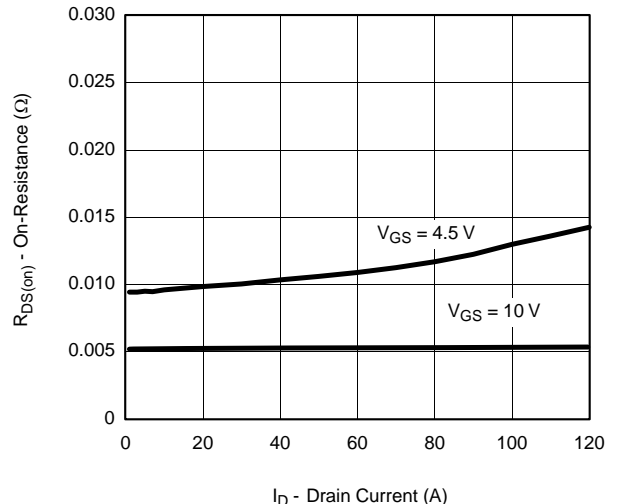## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

V_{GS} = 10 V thru 6 V
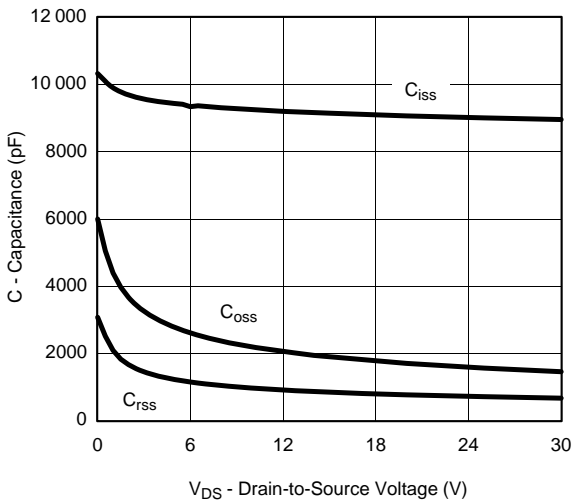
5 V

4 V

3 V

I_D - Drain Current (A)

V_{DS} - Drain-to-Source Voltage (V)

Output Characteristics

T_C = - 55 °C

25 °C

125 °C

I_D - Drain Current (A)

V_{GS} - Gate-to-Source Voltage (V)
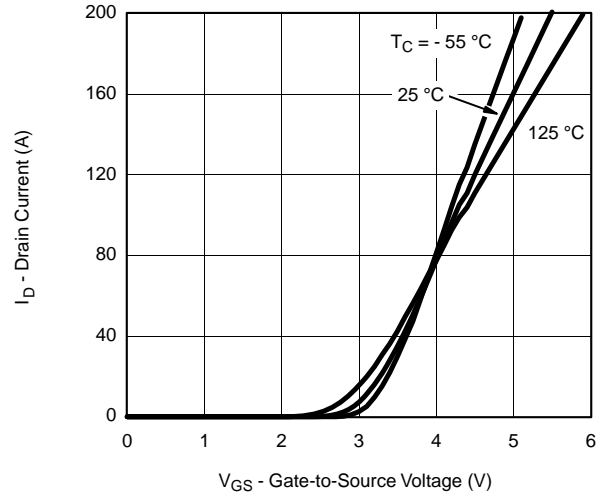
Transfer Characteristics

T_C = - 55 °C

25 °C

125 °C

g_{fs} - Transconductance (S)

I_D - Drain Current (A)

Transconductance

V_{GS} = 4.5 V

V_{GS} = 10 V

$R_{DS(on)}$ - On-Resistance (Ω)

I_D - Drain Current (A)

On-Resistance vs. Drain Current

C_{iss}

C_{oss}

C_{rss}

C - Capacitance (pF)

V_{DS} - Drain-to-Source Voltage (V)

Capacitance

V_{DS} = 15 V
I_D = 75 A
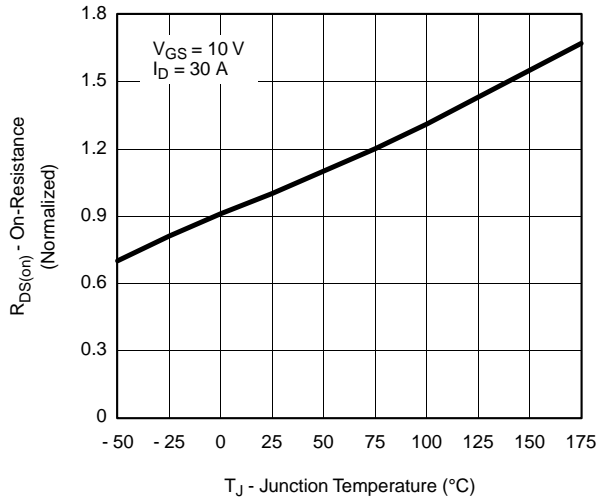
V_{GS} - Gate-to-Source Voltage (V)

Q_g - Total Gate Charge (nC)

Gate Charge

3

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

V_{GS} = 10 V
I_D = 30 A

$R_{DS(on)}$ - On-Resistance (Normalized)
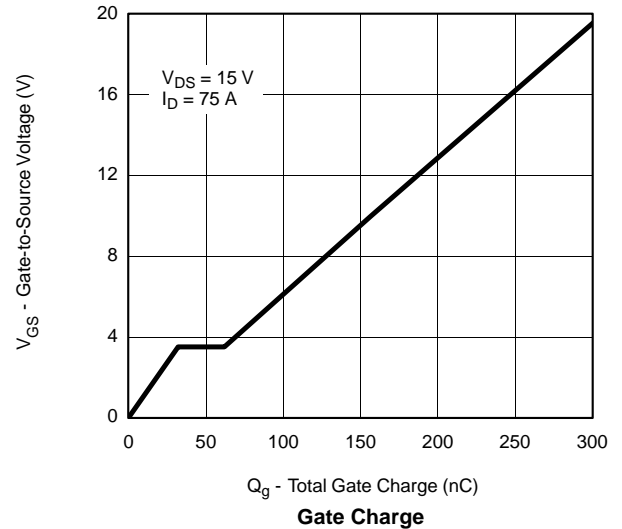
T_J - Junction Temperature (°C)

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)
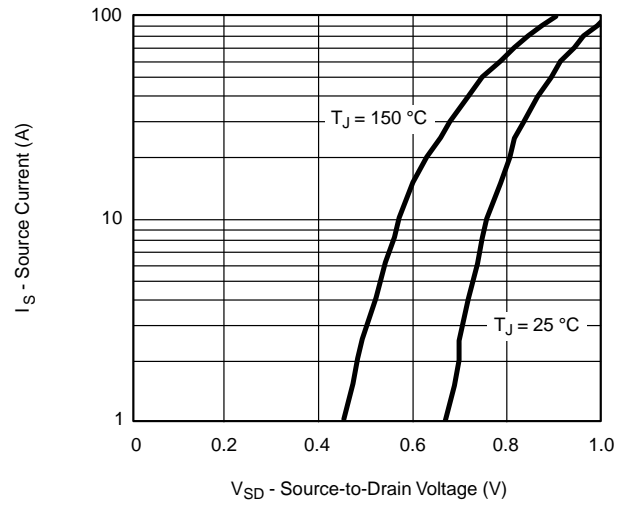
Source-Drain Diode Forward Voltage

I_{Dav} (a)

I_{AV} (A) at T_A = 25 °C

I_{AV} (A) at T_A = 150 °C

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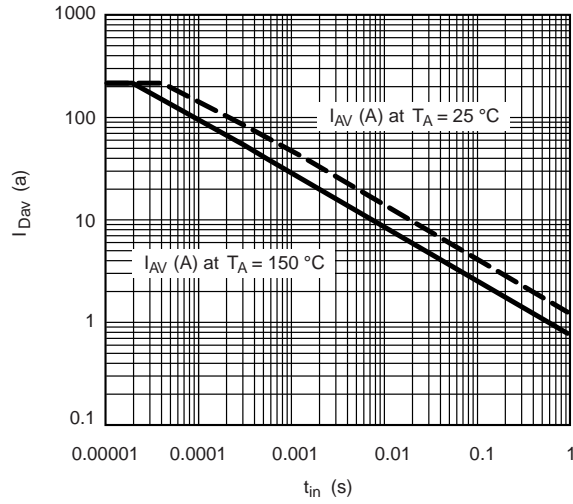
Avalanche Current vs. Time

I_D = 250 μA

V_{DS} (V)

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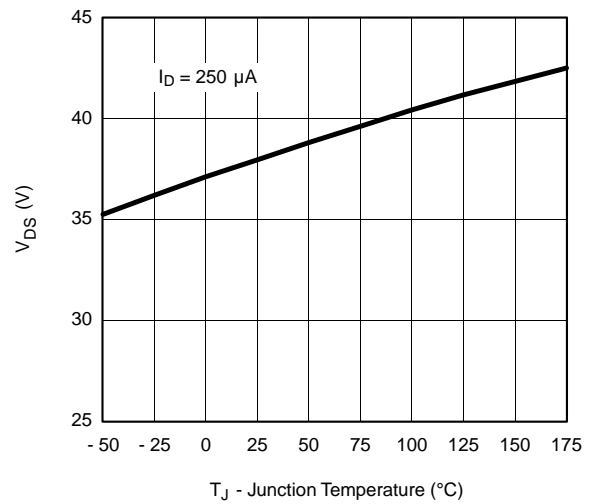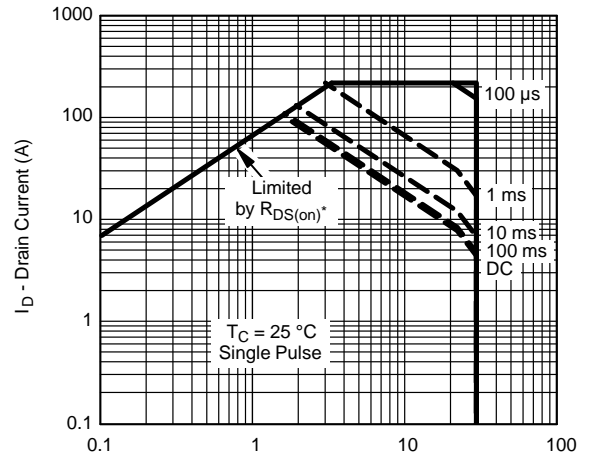
**Drain Source Breakdown
vs. Junction Temperature**

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

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)
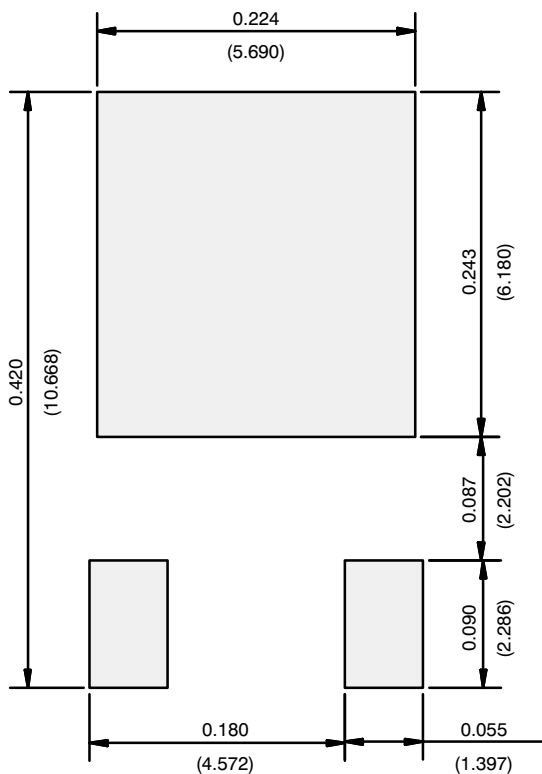
Recommended Minimum Pads
Dimensions in Inches/(mm)

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