IRF3706S-VB Datasheet

N-Channel 20-V (D-S),175°CMOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)[a]
20	0.006 @ V_{GS} = 4.5 V	85
	0.009 @ V_{GS} = 2.5 V	85

FEATURES

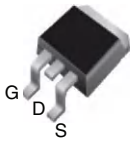
- Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2011/65/EU

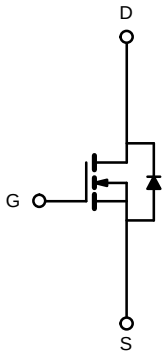
RoHS COMPLIANT
HALOGEN FREE

APPLICATIONS

- OR-ing
- Server
- DC/DC

D^2PAK (TO-263)





N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±12	
Continuous Drain Current (T_J = 175°C)	T_C = 25°C	I_D	85[a]	A
	T_C = 100°C		75	
Pulsed Drain Current		I_{DM}	240	
Avalanche Current		I_{AR}	30	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	45	mJ
Power Dissipation	T_C = 25°C	P_D	120[a]	W
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}	1.25	

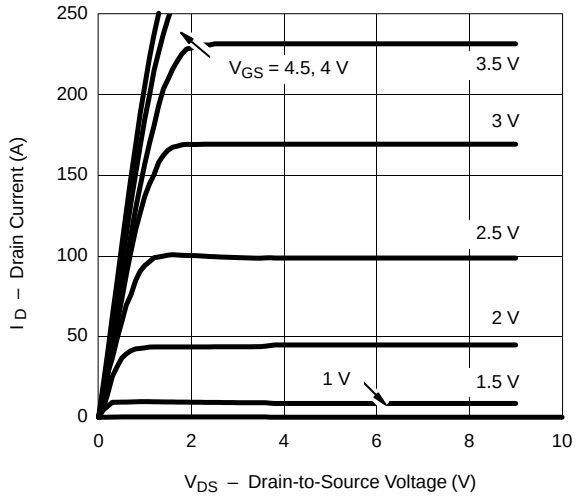
Notes:
a. See SOA curve for voltage derating.
b. Duty cycle ≤ 1%.
c. When mounted on 1" square PCB (FR-4 material).

MOSFET SPECIFICATIONS (T_J =25°C UNLESS OTHERWISE NOTED)						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typ**	**Max**	**Unit**
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA	20			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_{DS} = 250 μA	0.6			
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±12 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			1	μA
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 175°C			150	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 4.5 V	120			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 4.5 V, I_D = 30 A		0.006		Ω
		V_{GS} = 4.5 V, I_D = 30 A, T_J = 125°C		0.009		
		V_{GS} = 4.5 V, I_D = 30 A, T_J = 175°C		0.0111		
		V_{GS} = 2.5 V, I_D = 20 A		0.009		
Forward Transconductance[a]	g_{fs}	V_{DS} = 5 V, I_D = 30 A	20			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 20 V, f = 1 MHz		6600		pF
Output Capacitance	C_{oss}			1150		
Reversen Transfer Capacitance	C_{rss}			600		
Total Gate Charge[c]	Q_g	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 85 A		65	130	nC
Gate-Source Charge[c]	Q_{gs}			13		
Gate-Drain Charge[c]	Q_{gd}			14		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 10 V, R_L = 0.12 Ω I_D ≃ 85 A, V_{GEN} = 4.5 V, R_G = 2.5 Ω		25	40	ns
Rise Time[c]	t_r			120	180	
Turn-Off Delay Time[c]	$t_{d(off)}$			80	120	
Fall Time[c]	t_f			100	150	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Pulsed Current	I_{SM}				240	A
Forward Voltage[a]	V_{SD}	I_F = 100 A, V_{GS} = 0 V		1.2	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 50 A, di/dt = 100 A/μs		45	100	ns

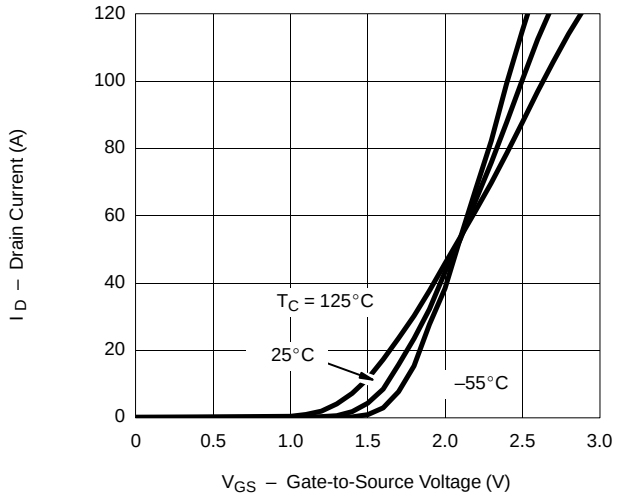
Notes:
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

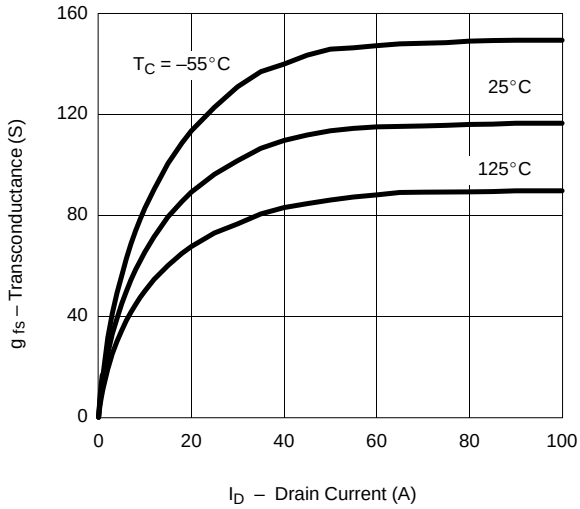
Output Characteristics



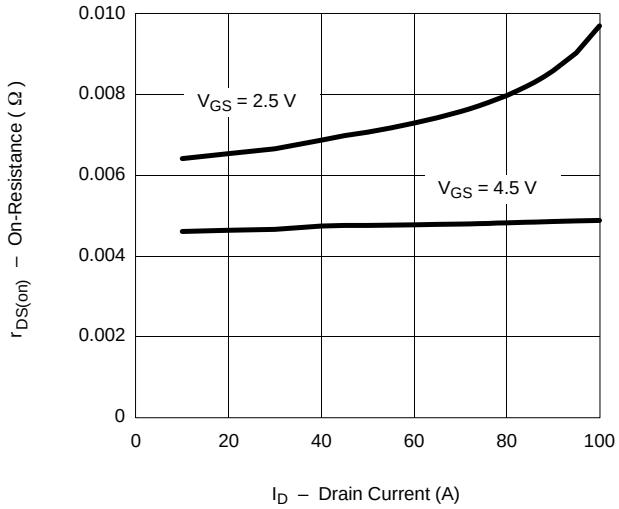
Transfer Characteristics



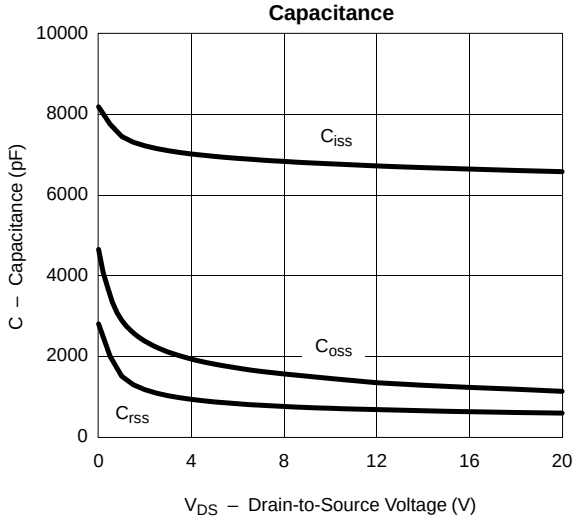
Transconductance



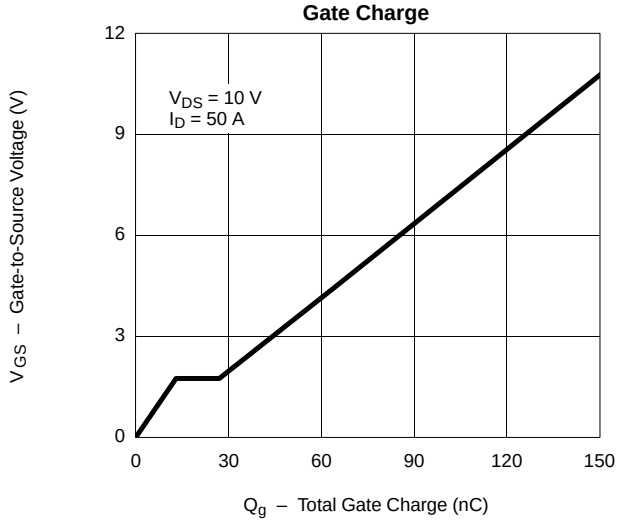
On-Resistance vs. Drain Current



Capacitance

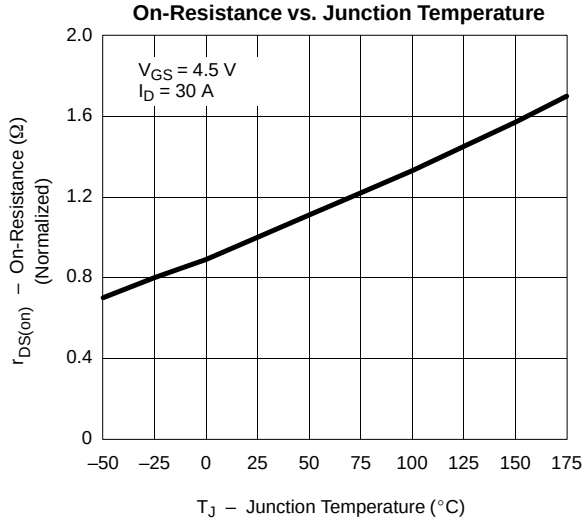


Gate Charge

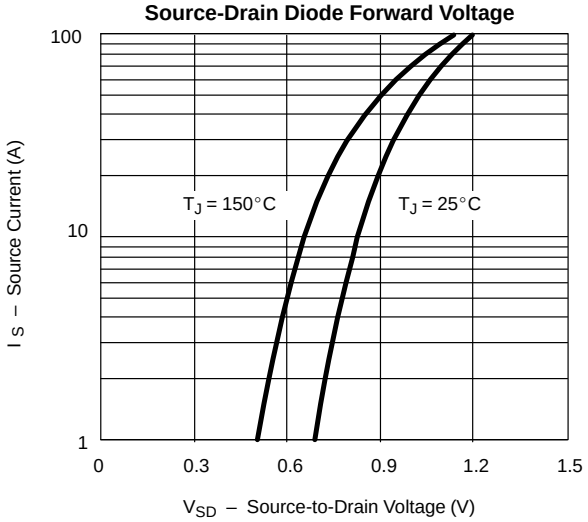


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

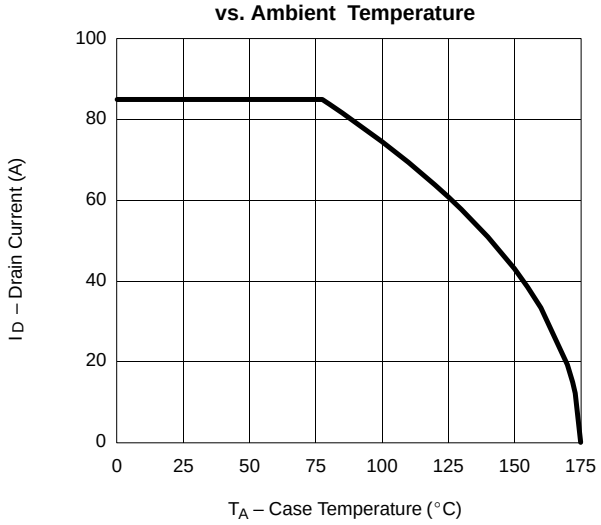


Source-Drain Diode Forward Voltage

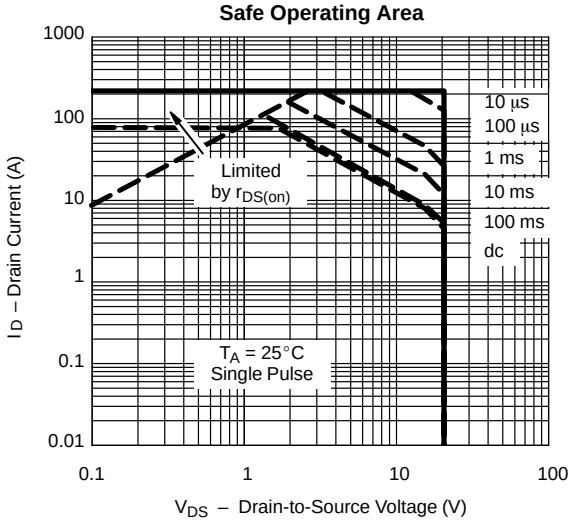


THERMAL RATINGS

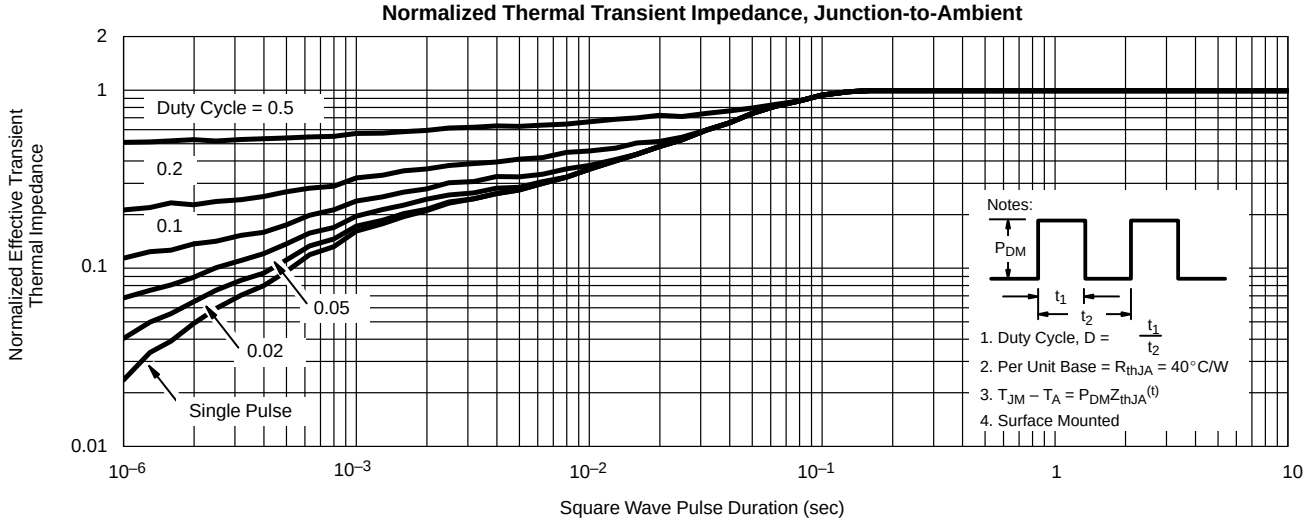
Maximum Avalanche Drain Current vs. Ambient Temperature



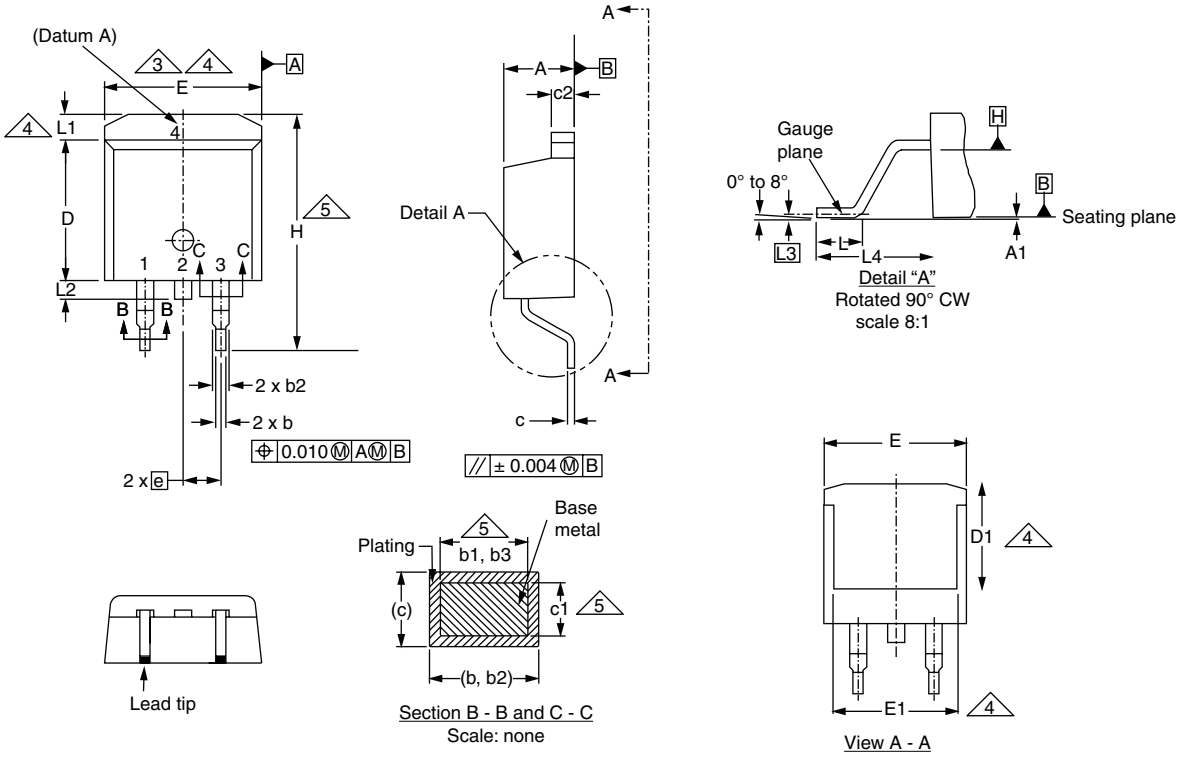
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



TO-263AB (HIGH VOLTAGE)



	MILLIMETERS		INCHES	
DIM.	MIN.	MAX.	MIN.	MAX.
A	4.06	4.83	0.160	0.190
A1	0.00	0.25	0.000	0.010
b	0.51	0.99	0.020	0.039
b1	0.51	0.89	0.020	0.035
b2	1.14	1.78	0.045	0.070
b3	1.14	1.73	0.045	0.068
c	0.38	0.74	0.015	0.029
c1	0.38	0.58	0.015	0.023
c2	1.14	1.65	0.045	0.065
D	8.38	9.65	0.330	0.380

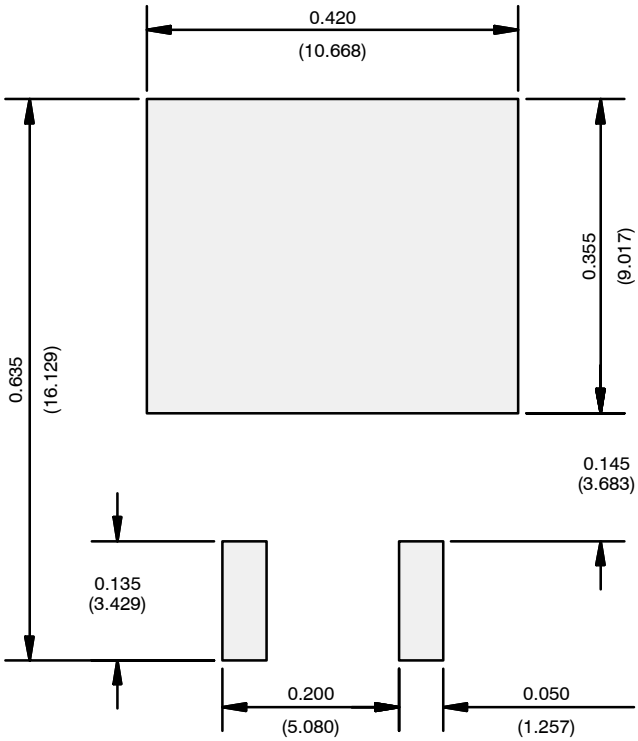
	MILLIMETERS		INCHES	
DIM.	MIN.	MAX.	MIN.	MAX.
D1	6.86	-	0.270	-
E	9.65	10.67	0.380	0.420
E1	6.22	-	0.245	-
e	2.54 BSC		0.100 BSC	
H	14.61	15.88	0.575	0.625
L	1.78	2.79	0.070	0.110
L1	-	1.65	-	0.066
L2	-	1.78	-	0.070
L3	0.25 BSC		0.010 BSC	
L4	4.78	5.28	0.188	0.208

ECN: S-82110-Rev. A, 15-Sep-08
DWG: 5970

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension D and E do not include mold flash. Mold flash shall not exceed 0.127 mm (0.005") per side. These dimensions are measured at the outmost extremes of the plastic body at datum A.
4. Thermal PAD contour optional within dimension E, L1, D1 and E1.
5. Dimension b1 and c1 apply to base metal only.
6. Datum A and B to be determined at datum plane H.
7. Outline conforms to JEDEC outline to TO-263AB.

RECOMMENDED MINIMUM PADS FOR D²PAK: 3-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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