

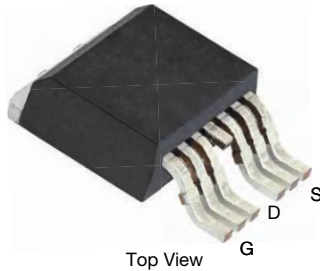
IRF1405ZS-7PPBF-VB Datasheet

N-Channel 60 V (D-S) 175 °C MOSFET

PRODUCT SUMMARY

V_{DS} (V)	60
$R_{DS(on)}$ (Ω) at $V_{GS} = 10$ V	0.00163
I_D (A)	150
Configuration	Single
Package	TO-263-7L

TO-263 7-Lead

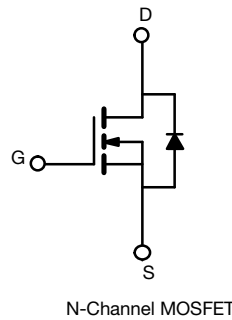


FEATURES

- Trench power MOSFET
- Package with low thermal resistance
- 100 % R_g and UIS tested



RoHS
COMPLIANT
HALOGEN
FREE



ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current	$T_C = 25$ °C	I_D	150	A
	$T_C = 125$ °C		120 ^a	
Continuous source current (diode conduction) ^a		I_S	120	
Pulsed drain current ^b		I_{DM}	400	
Single pulse avalanche current	L = 0.1 mH	I_{AS}	75	
Single pulse avalanche energy		E_{AS}	281	mJ
Maximum power dissipation ^b	$T_C = 25$ °C	P_D	375	W
	$T_C = 125$ °C		125	
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 ^c	R_{thJA}	40	°C/W
Junction-to-case (drain)		R_{thJC}	0.4	

Notes

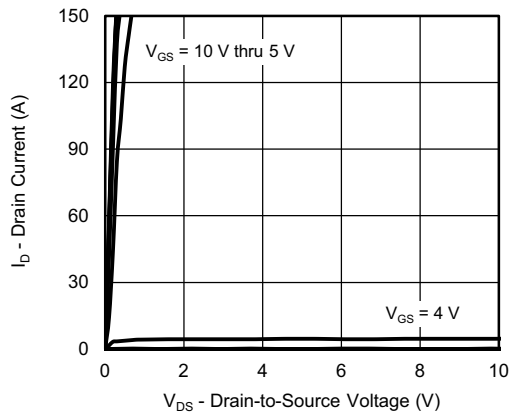
- a. Package limited
 b. Pulse test; pulse width ≤ 300 μ s, duty cycle ≤ 2 %
 c. When mounted on 1" square PCB (FR4 material)

SPECIFICATIONS (T _C = 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		60	-	-	V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA		2.5	3.0	3.5	
Gate-source leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V		-	-	± 100	nA
Zero gate voltage drain current	I _{DSS}	V _{GS} = 0 V	V _{DS} = 60 V	-	-	1	μA
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 125 °C	-	-	50	
		V _{GS} = 0 V	V _{DS} = 60 V, T _J = 175 °C	-	-	250	μA
On-state drain current ^a	I _{D(on)}	V _{GS} = 10 V	V _{DS} ≥ 5 V	120	-	-	A
Drain-source on-state resistance ^a	R _{DS(on)}	V _{GS} = 10 V	I _D = 30 A	-	0.00163	-	Ω
		V _{GS} = 10 V	I _D = 30 A, T _J = 125 °C	-	0.00300	-	
		V _{GS} = 10 V	I _D = 30 A, T _J = 175 °C	-	0.00360	-	
Forward transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 30 A		-	142	-	S
Dynamic ^b							
Input capacitance	C _{iss}	V _{GS} = 0 V	V _{DS} = 25 V, f = 1 MHz	-	9100	11 900	pF
Output capacitance	C _{oss}			-	3550	4700	
Reverse transfer capacitance	C _{rss}			-	160	220	
Total gate charge ^c	Q _g	V _{GS} = 10 V	V _{DS} = 30 V, I _D = 50 A	-	123	185	nC
Gate-source charge ^c	Q _{gs}			-	40	-	
Gate-drain charge ^c	Q _{gd}			-	19	-	
Gate resistance	R _g	f = 1 MHz		4	8.6	13	Ω
Turn-on delay time ^c	t _{d(on)}	V _{DD} = 30 V, R _L = 0.6 Ω I _D ≅ 50 A, V _{GEN} = 10 V, R _g = 1 Ω		-	48	75	ns
Rise time ^c	t _r			-	26	40	
Turn-off delay time ^c	t _{d(off)}			-	105	160	
Fall time ^c	t _f			-	25	40	
Source-Drain Diode Ratings and Characteristics ^b							
Pulsed current ^a	I _{SM}			-	-	240	A
Forward voltage	V _{SD}	I _F = 50 A, V _{GS} = 0 V		-	0.84	1.5	V
Body diode reverse recovery time	t _{rr}	I _F = 25 A, di/dt = 100 A/μs		-	100	200	ns
Body diode reverse recovery charge	Q _{rr}			-	243	500	nC
Reverse recovery fall time	t _a			-	48	-	ns
Reverse recovery rise time	t _b			-	53	-	
Body diode peak reverse recovery current	I _{RM(REC)}			-	-4.6	-	A

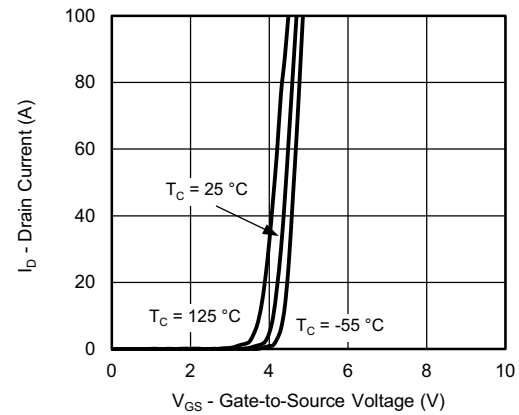
Notes

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

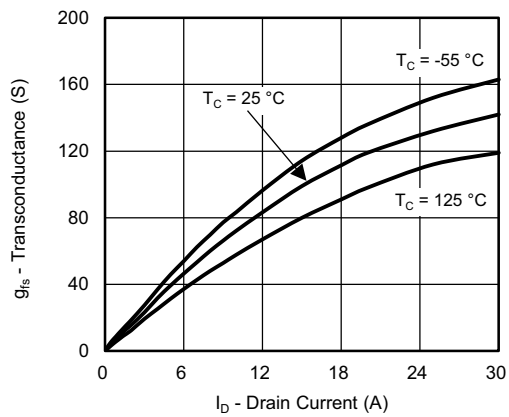
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, unless otherwise noted)



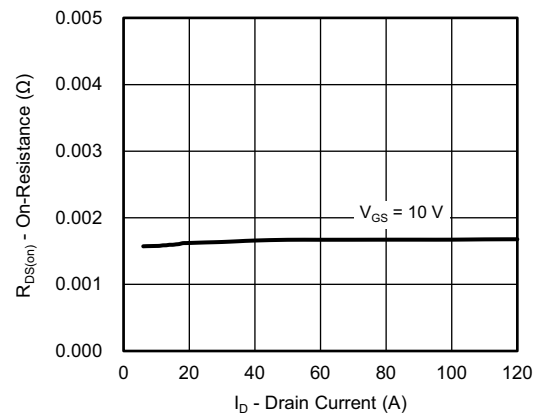
Output Characteristics



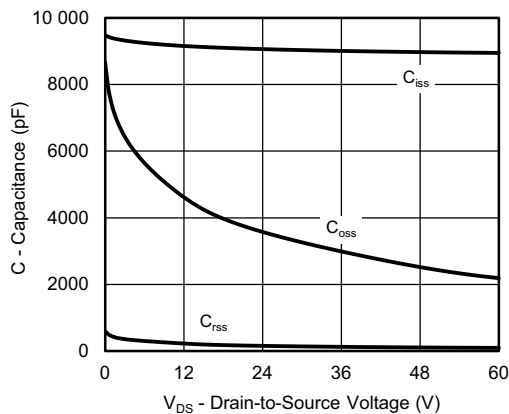
Transfer Characteristics



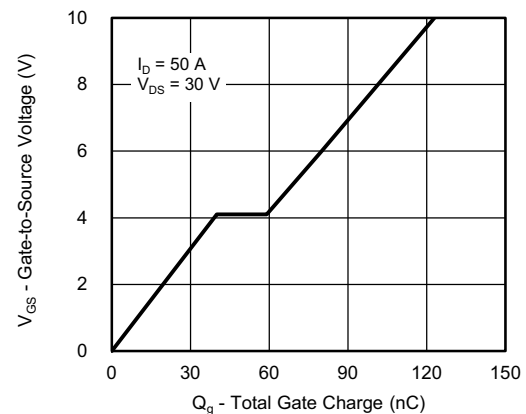
Transconductance



On-Resistance vs. Drain Current

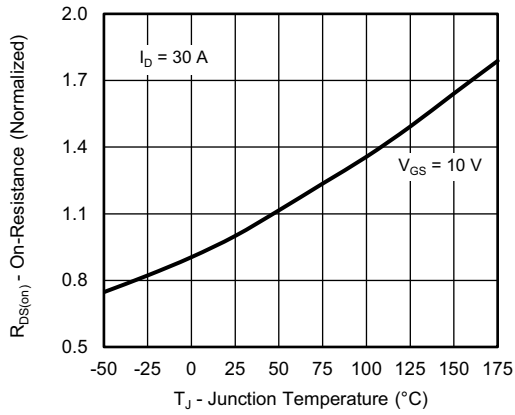


Capacitance

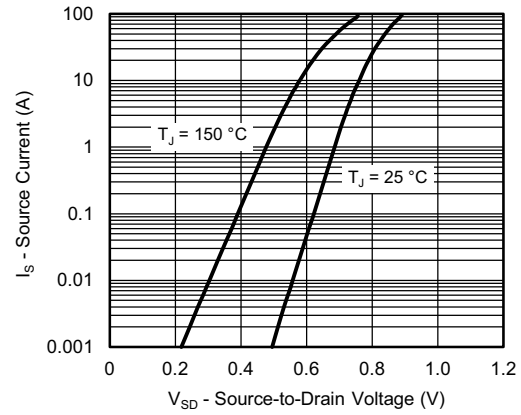


Gate Charge

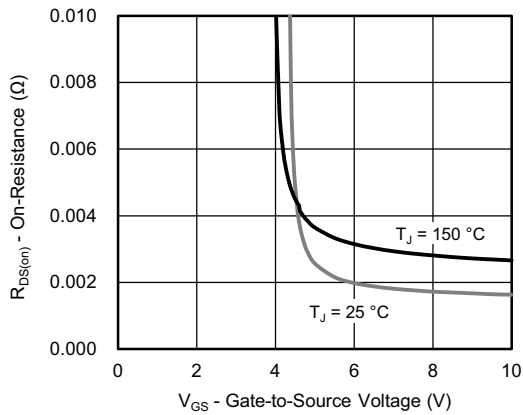
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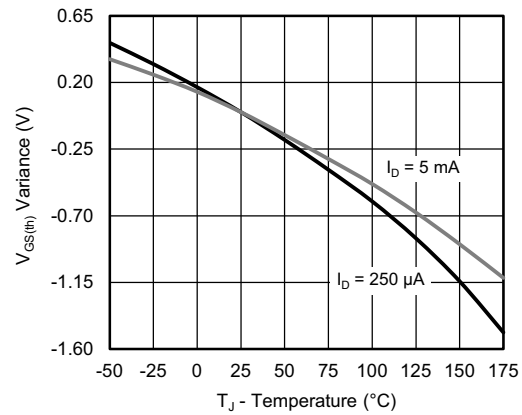
On-Resistance vs. Junction Temperature



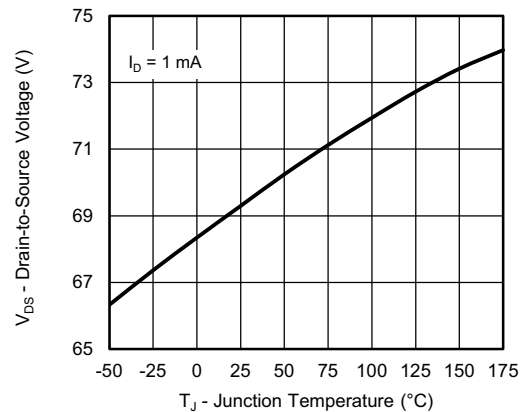
Source Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

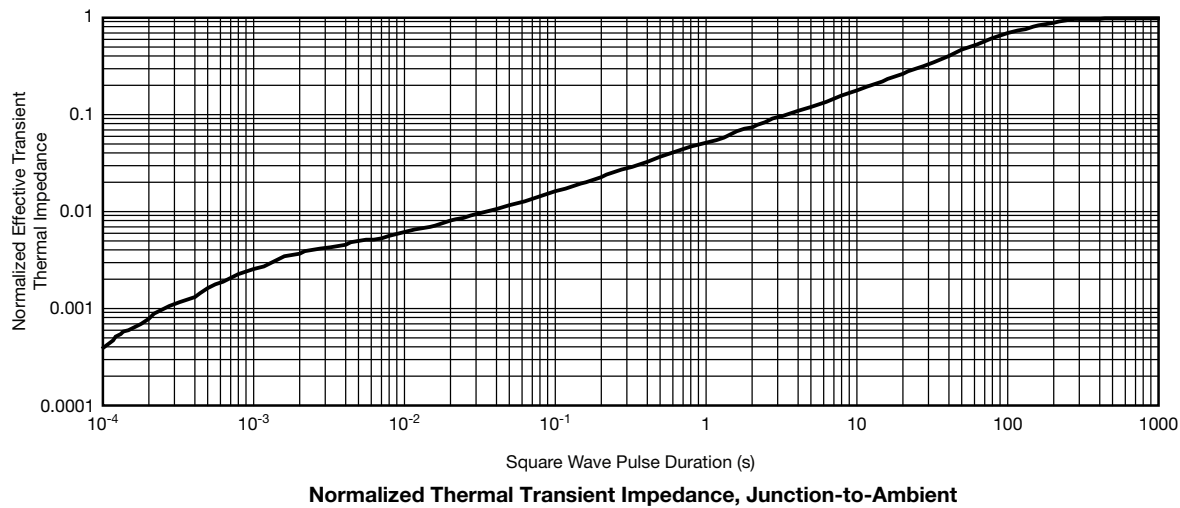
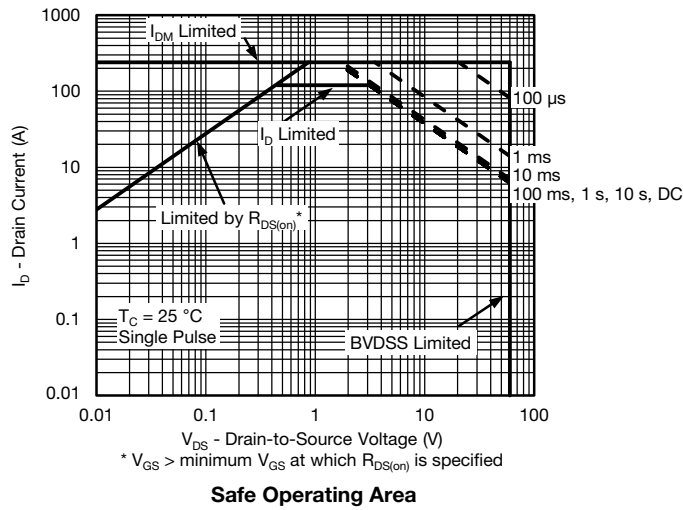


Threshold Voltage

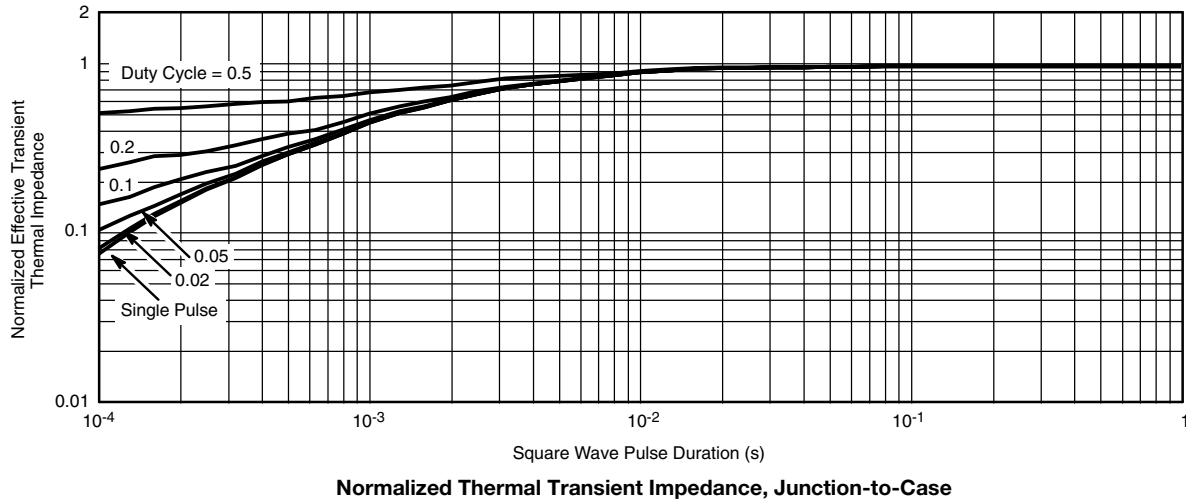


Drain Source Breakdown vs. Junction Temperature

THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



THERMAL RATINGS ($T_A = 25\text{ }^{\circ}\text{C}$, unless otherwise noted)



Note

- The characteristics shown in the two graphs
 - Normalized Transient Thermal Impedance Junction-to-Ambient ($25\text{ }^{\circ}\text{C}$)
 - Normalized Transient Thermal Impedance Junction-to-Case ($25\text{ }^{\circ}\text{C}$)
- are given for general guidelines only to enable the user to get a "ball park" indication of part capabilities. The data are extracted from single pulse transient thermal impedance characteristics which are developed from empirical measurements. The latter is valid for the part mounted on printed circuit board - FR4, size 1" x 1" x 0.062", double sided with 2 oz. copper, 100 % on both sides. The part capabilities can widely vary depending on actual application parameters and operating conditions

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