

# IRFM120A-VB Datasheet

## N-Channel 100-V (D-S) MOSFET

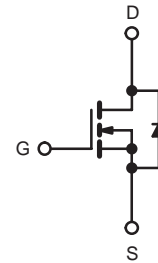
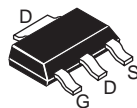
### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
100	0.100 at $V_{GS} = 10$ V	5.0
		4.5

### FEATURES

- Halogen-free According to IEC 61249-2-21 Definition
- TrenchFET® Power MOSFETs
- 175 °C Maximum Junction Temperature
- Compliant to RoHS Directive 2002/95/EC


**RoHS**  
 COMPLIANT

**SOT-223**


N-Channel MOSFET

### ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted

Parameter	Symbol	10 s	Steady State	Unit
Drain-Source Voltage	$V_{DS}$	100		V
Gate-Source Voltage	$V_{GS}$	$\pm 20$		
Continuous Drain Current ( $T_J = 175$ °C) <sup>a</sup>	$T_A = 25$ °C	$I_D$	5.0	A
	$T_A = 70$ °C		3.5	
Pulsed Drain Current	$I_{DM}$	25		
Avalanche Current	$I_{AS}$	15		
Single Pulse Avalanche Energy	$E_{AS}$	11		mJ
Maximum Power Dissipation <sup>a</sup>	$T_A = 25$ °C	$P_D$	3.3	W
	$T_A = 70$ °C		2.3	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175		°C

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	$t \leq 10$ s	36	°C/W
		Steady State	75	
Maximum Junction-to-Foot (Drain)	$R_{thJF}$	Steady State	17	

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

**SPECIFICATIONS**  $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted

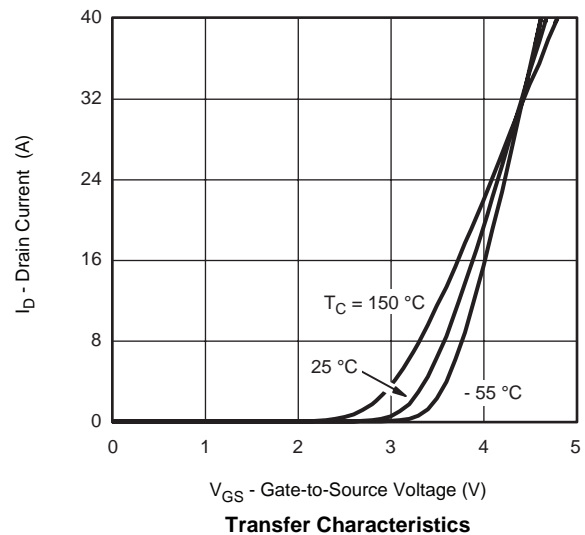
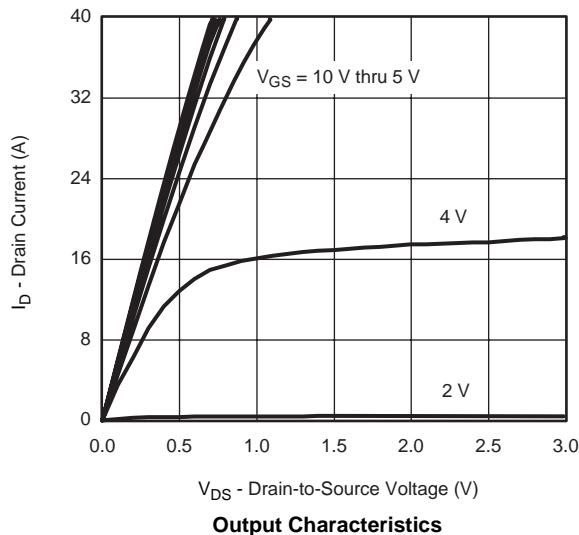
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	1.5		3	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			20	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 10\text{ V}$	40			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 6.0\text{ A}$		0.110		$\Omega$
		$V_{GS} = 10\text{ V}, I_D = 4.0\text{ A}, T_J = 125\text{ }^\circ\text{C}$		0.122		
		$V_{GS} = 10\text{ V}, I_D = 4.0\text{ A}, T_J = 175\text{ }^\circ\text{C}$		0.140		
		$V_{GS} = 4.5\text{ V}, I_D = 3.1\text{ A}$		0.120		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 15\text{ V}, I_D = 4.0\text{ A}$		25		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 1.7\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 4.0\text{ A}$		18	27	nC
Gate-Source Charge	$Q_{gs}$			3.4		
Gate-Drain Charge	$Q_{gd}$			5.3		
Gate Resistance	$R_g$	$V_{GS} = 0.1\text{ V}, f = 5\text{ MHz}$	0.5	1.4	2.4	$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 50\text{ V}, R_L = 30\text{ }\Omega$ $I_D \cong 1\text{ A}, V_{GEN} = 10\text{ V}, R_g = 6\text{ }\Omega$		10	20	ns
Rise Time	$t_r$			10	20	
Turn-Off Delay Time	$t_{d(off)}$			25	50	
Fall Time	$t_f$			12	24	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 1.7\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		50	80	

Notes:

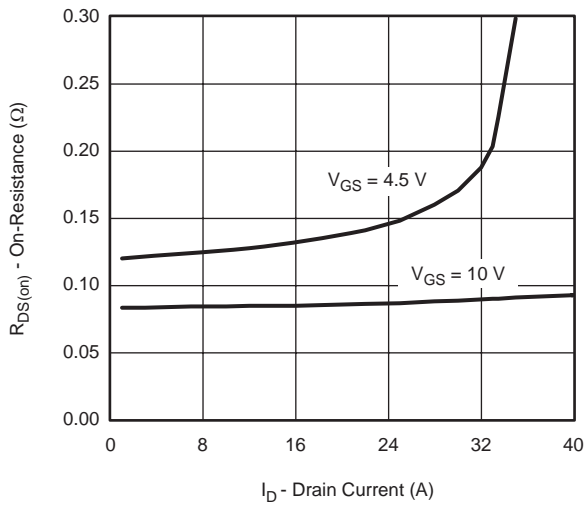
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

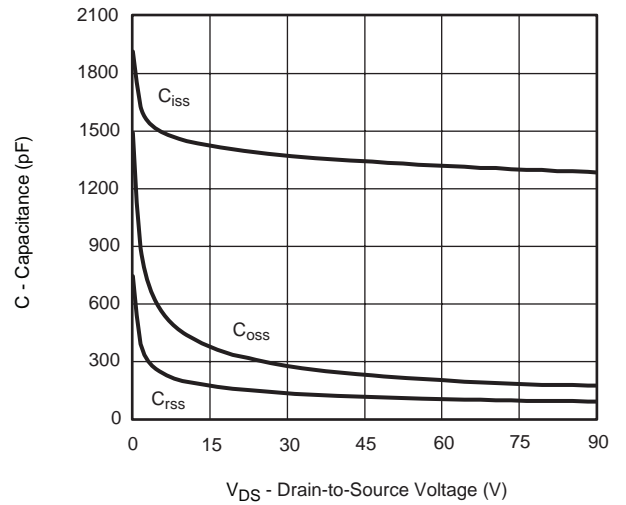
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure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

**TYPICAL CHARACTERISTICS**  $25\text{ }^\circ\text{C}$ , unless otherwise noted

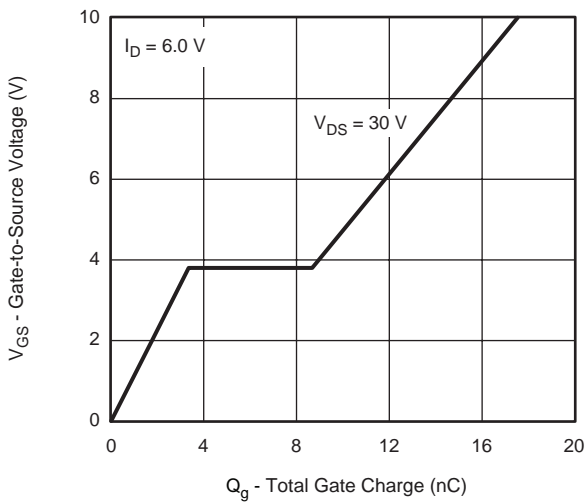
## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



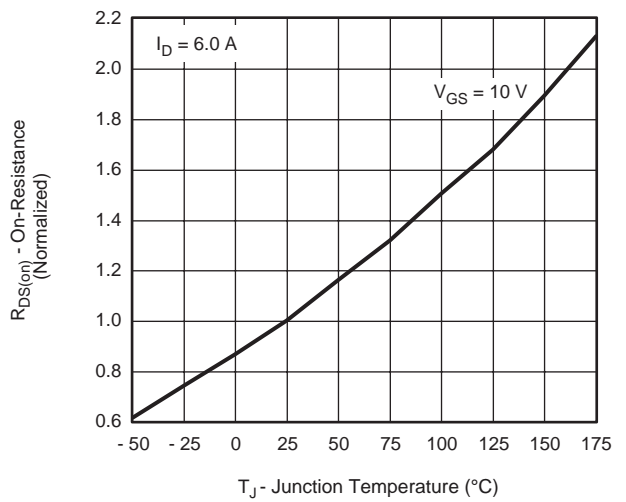
On-Resistance vs. Drain Current



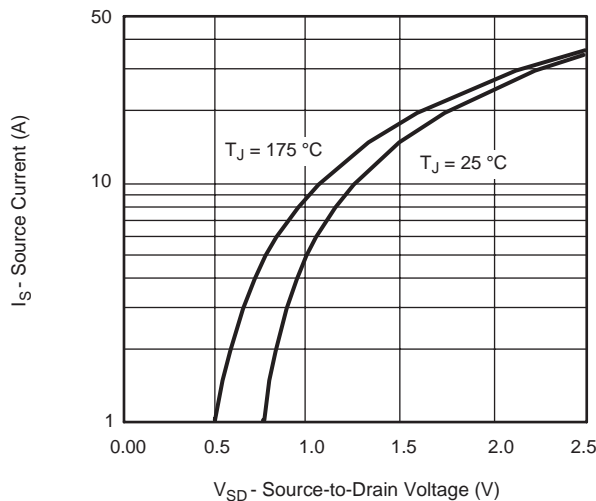
Capacitance



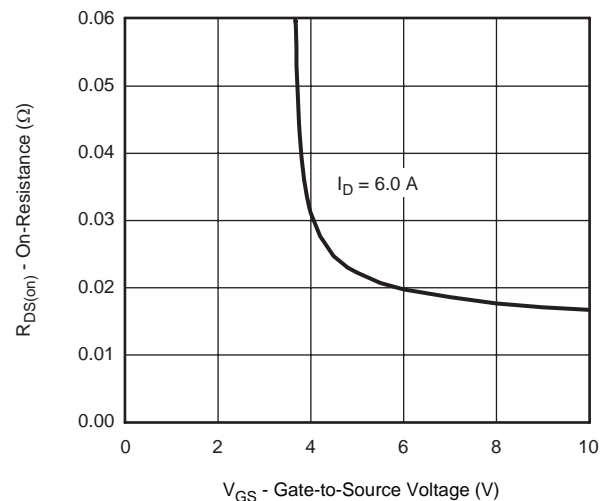
Gate Charge



On-Resistance vs. Junction Temperature

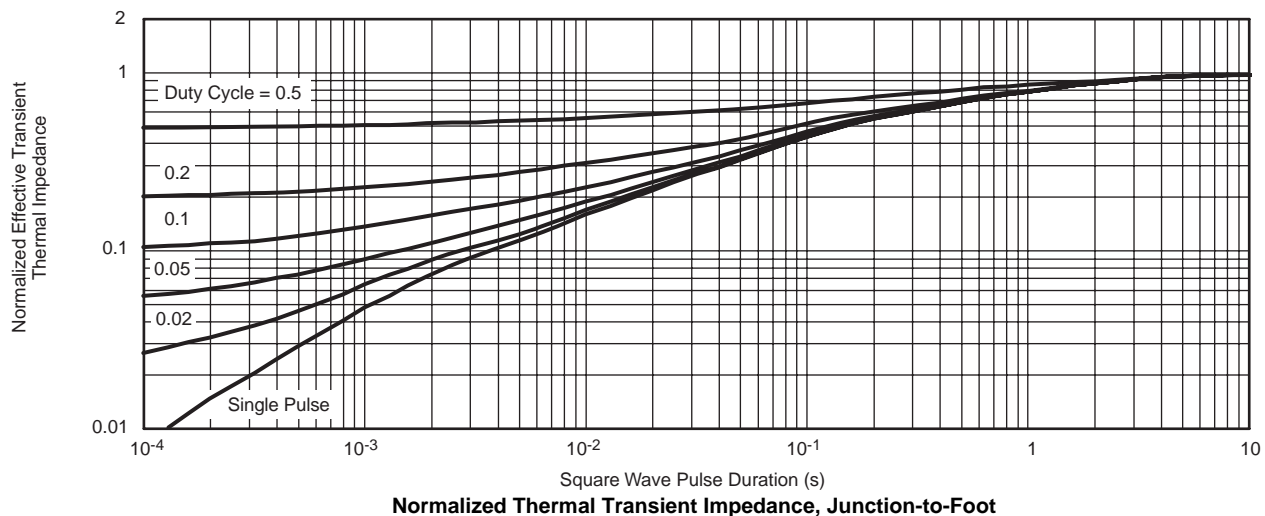
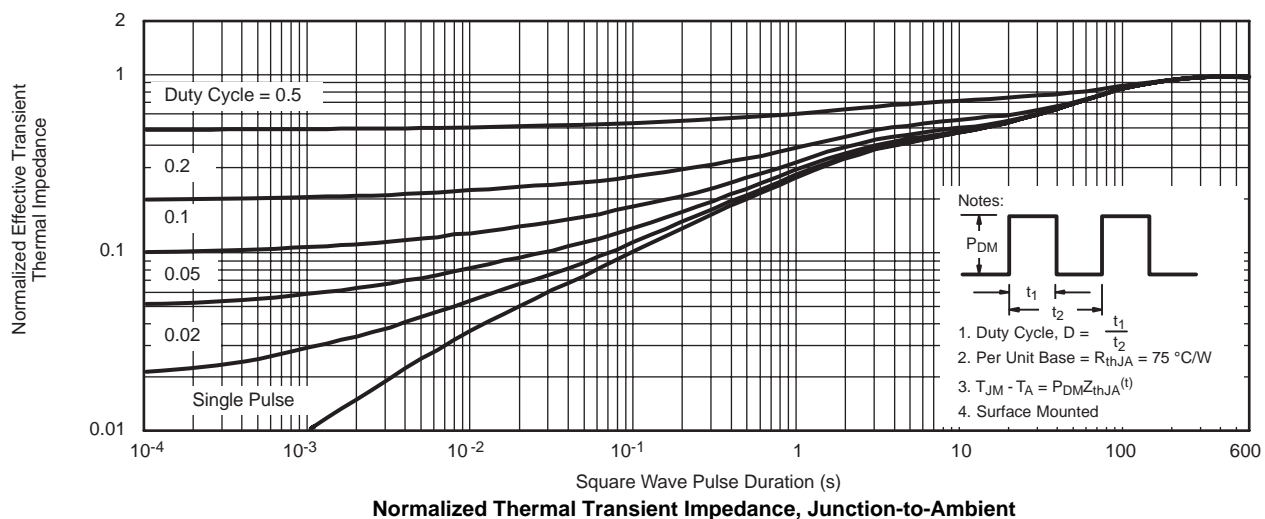
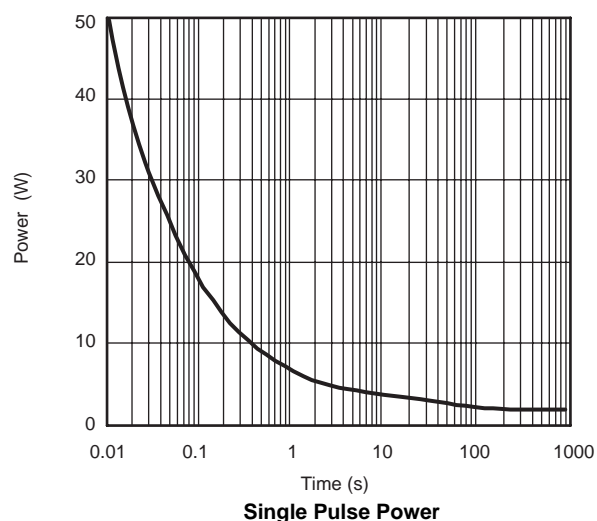
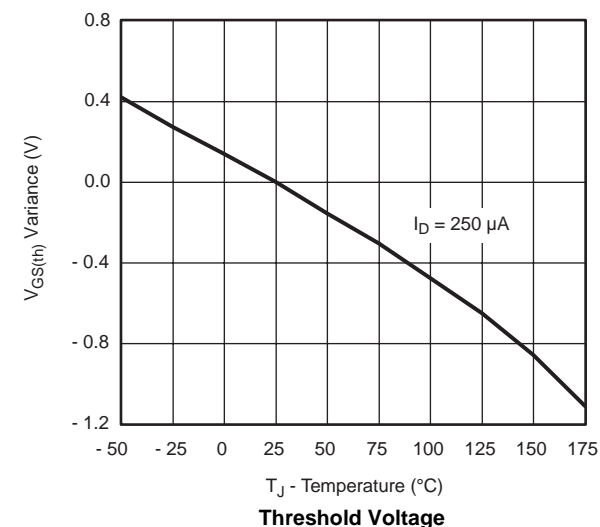


Source-Drain Diode Forward Voltage

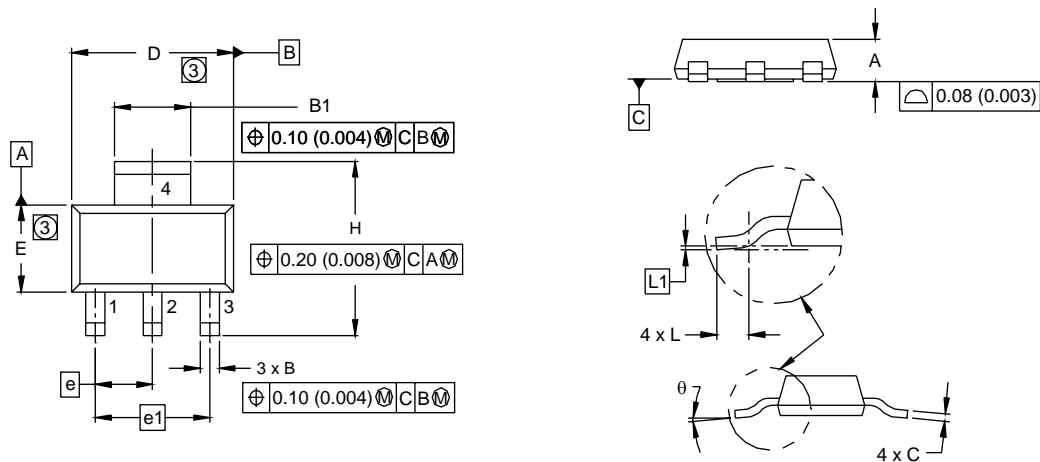


On-Resistance vs. Gate-to-Source Voltage

## TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



**SOT-223 (HIGH VOLTAGE)**



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.55	1.80	0.061	0.071
B	0.65	0.85	0.026	0.033
B1	2.95	3.15	0.116	0.124
C	0.25	0.35	0.010	0.014
D	6.30	6.70	0.248	0.264
E	3.30	3.70	0.130	0.146
e	2.30 BSC		0.0905 BSC	
e1	4.60 BSC		0.181 BSC	
H	6.71	7.29	0.264	0.287
L	0.91	-	0.036	-
L1	0.061 BSC		0.0024 BSC	
theta	-	10°	-	10°
ECN: S-82109-Rev. A, 15-Sep-08 DWG: 5969				

**Notes**

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension do not include mold flash.
4. Outline conforms to JEDEC outline TO-261AA.

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