

# IRFU540ZPBF-VB Datasheet

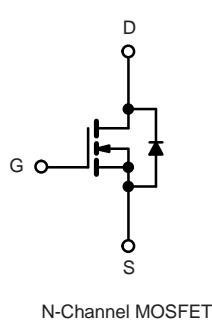
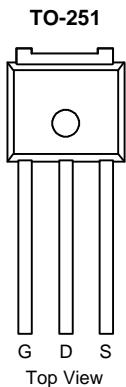
## N-Channel 100 V (D-S) MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
100	0.036 at $V_{GS} = 10$ V	35

### FEATURES

- TrenchFET® Power MOSFET
- 175 °C Junction Temperature
- PWM Optimized
- 100 %  $R_g$  Tested
- Compliant to RoHS Directive 2002/95/EC



### APPLICATIONS

- Primary Side Switch

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 175$ °C) <sup>b</sup>	$I_D$	35	A
		30	
Pulsed Drain Current	$I_{DM}$	110	
Continuous Source Current (Diode Conduction)	$I_S$	23	
Avalanche Current	$I_{AS}$	3	
Single Pulse Avalanche Energy	$E_{AS}$	18	mJ
Maximum Power Dissipation	$P_D$	96 <sup>b</sup>	W
		3 <sup>a</sup>	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	°C

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	15	18	°C/W
		40	50	
Junction-to-Case (Drain)	$R_{thJC}$	0.85	1.1	

Notes:

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

b. See SOA curve for voltage derating.

<b>SPECIFICATIONS</b> ( $T_J = 25^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ. <sup>a</sup>	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0 \text{ V}$ , $I_D = 250 \mu\text{A}$	100			V
Gate Threshold Voltage	$V_{GS(\text{th})}$	$V_{DS} = V_{GS}$ , $I_D = 250 \mu\text{A}$	2		4	
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	
		$V_{DS} = 80 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 125^\circ\text{C}$			50	$\mu\text{A}$
		$V_{DS} = 80 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $T_J = 175^\circ\text{C}$			250	
On-State Drain Current <sup>b</sup>	$I_{D(\text{on})}$	$V_{DS} = 5 \text{ V}$ , $V_{GS} = 10 \text{ V}$	35			A
Drain-Source On-State Resistance <sup>b</sup>	$R_{DS(\text{on})}$	$V_{GS} = 10 \text{ V}$ , $I_D = 3 \text{ A}$		0.036		
		$V_{GS} = 10 \text{ V}$ , $I_D = 3 \text{ A}$ , $T_J = 125^\circ\text{C}$		0.040		$\Omega$
		$V_{GS} = 10 \text{ V}$ , $I_D = 3 \text{ A}$ , $T_J = 175^\circ\text{C}$		0.050		
		$V_{GS} = 6 \text{ V}$ , $I_D = 3 \text{ A}$		0.039		
Forward Transconductance <sup>b</sup>	$g_{fs}$	$V_{DS} = 15 \text{ V}$ , $I_D = 3 \text{ A}$		35		S
<b>Dynamic<sup>a</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0 \text{ V}$ , $V_{DS} = 25 \text{ V}$ , $F = 1 \text{ MHz}$		4000		
Output Capacitance	$C_{oss}$			500		$\text{pF}$
Reverse Transfer Capacitance	$C_{rss}$			180		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 50 \text{ V}$ , $V_{GS} = 10 \text{ V}$ , $I_D = 3 \text{ A}$		34		
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			8		$\text{nC}$
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			12		
Gate Resistance	$R_g$	$V_{DD} = 50 \text{ V}$ , $R_L = 5.2 \Omega$ $I_D \geq 3 \text{ A}$ , $V_{GEN} = 10 \text{ V}$ , $R_g = 2.5 \Omega$	0.5		2.9	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(\text{on})}$			15	25	
Rise Time <sup>c</sup>	$t_r$			50	75	
Turn-Off Delay Time <sup>c</sup>	$t_{d(\text{off})}$			30	45	
Fall Time <sup>c</sup>	$t_f$			60	90	ns
<b>Source-Drain Diode Ratings and Characteristics</b> ( $T_C = 25^\circ\text{C}$ )						
Pulsed Current	$I_{SM}$				5	A
Diode Forward Voltage <sup>b</sup>	$V_{SD}$	$I_F = 3 \text{ A}$ , $V_{GS} = 0 \text{ V}$		0.9	1.5	V
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = 3 \text{ A}$ , $dI/dt = 100 \text{ A}/\mu\text{s}$		180	250	ns

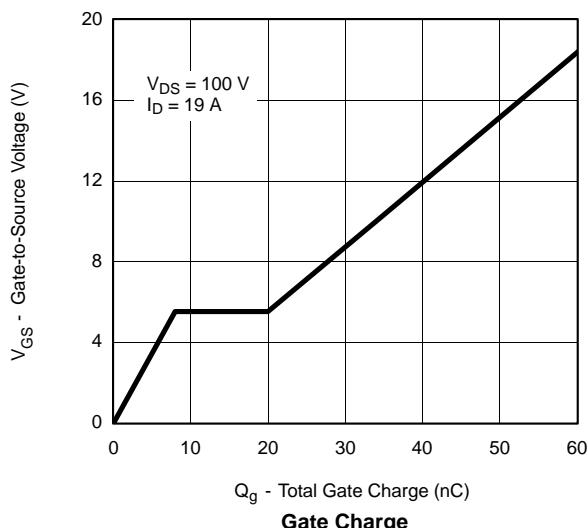
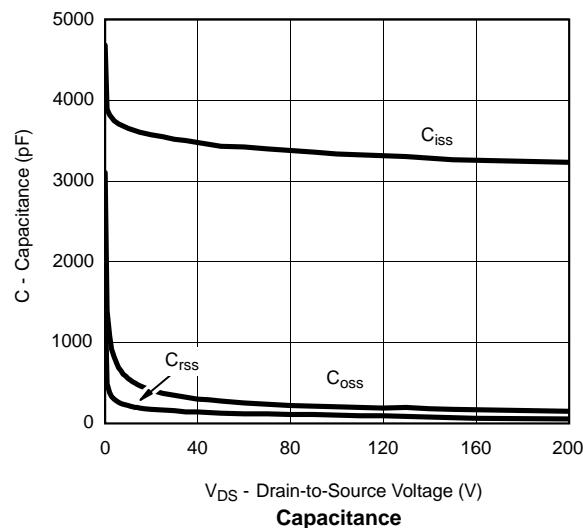
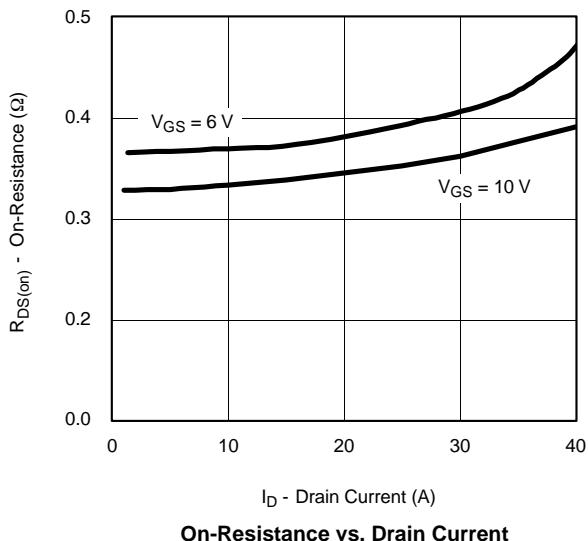
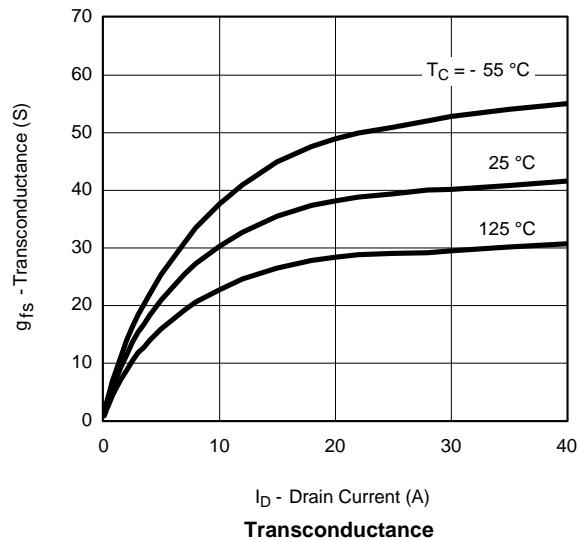
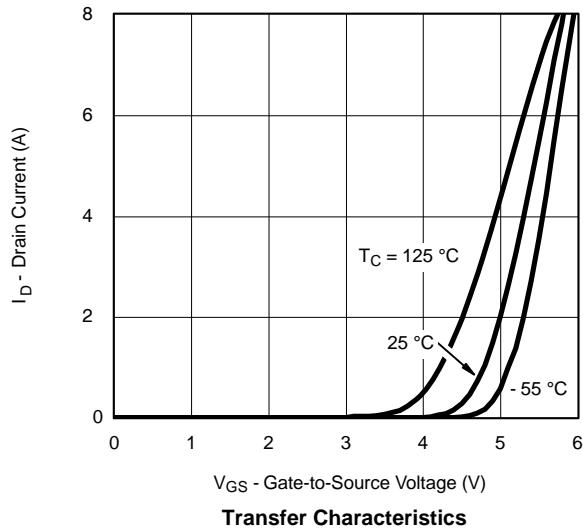
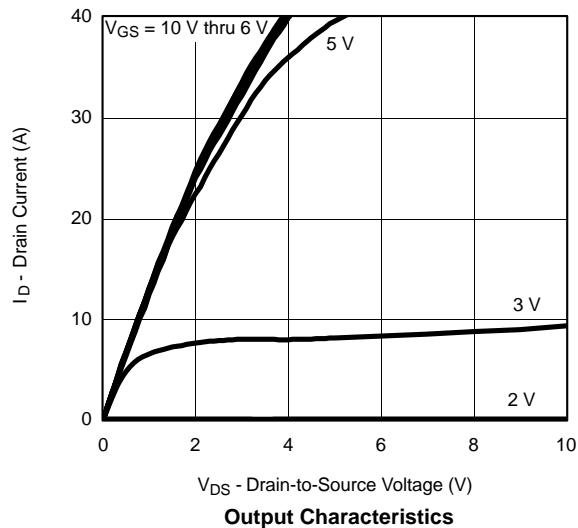
Notes:

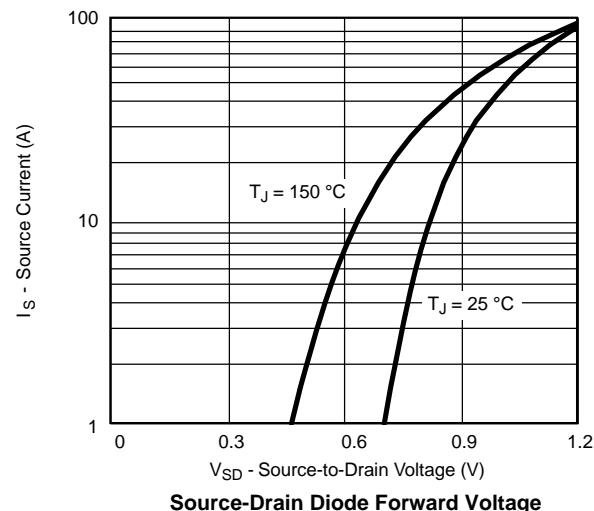
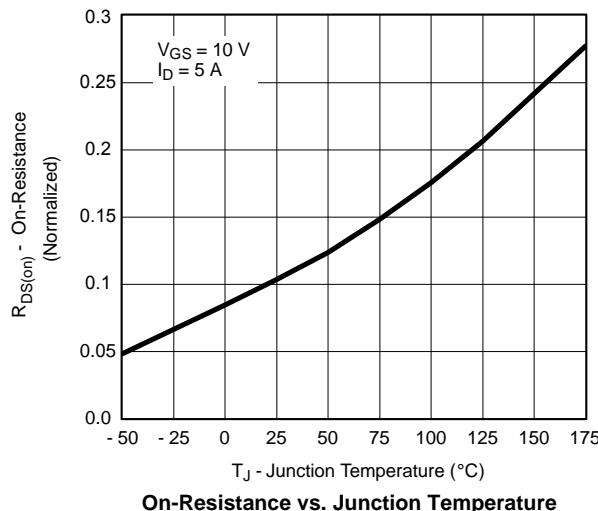
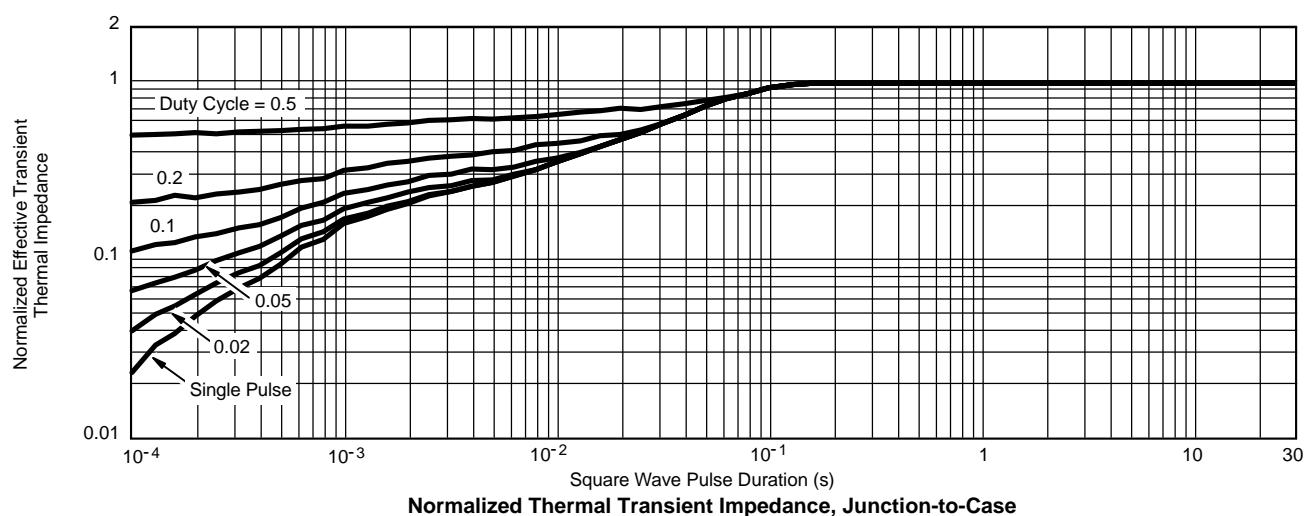
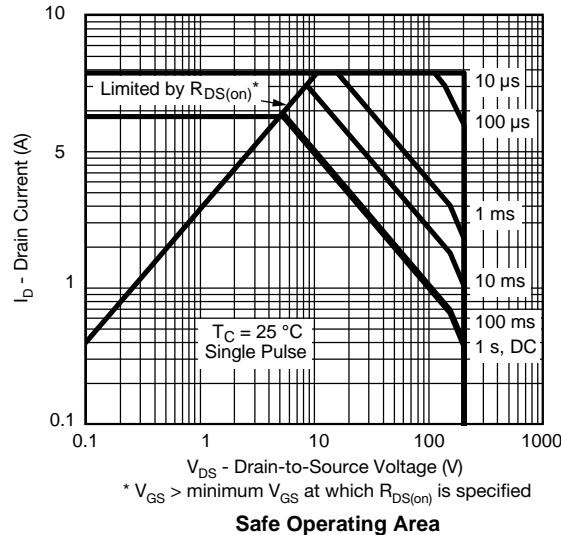
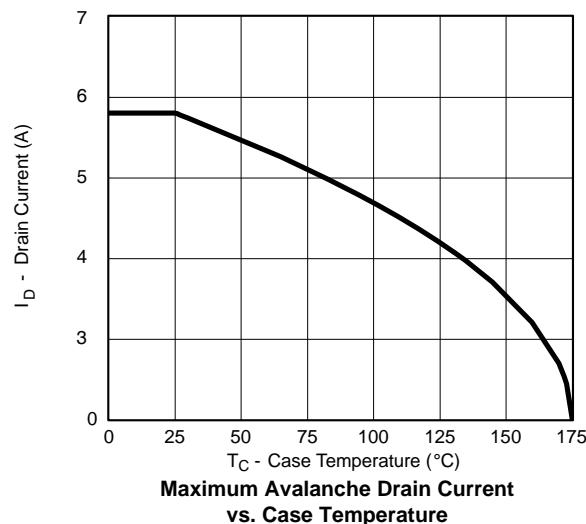
a. Guaranteed by design, not subject to production testing.

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

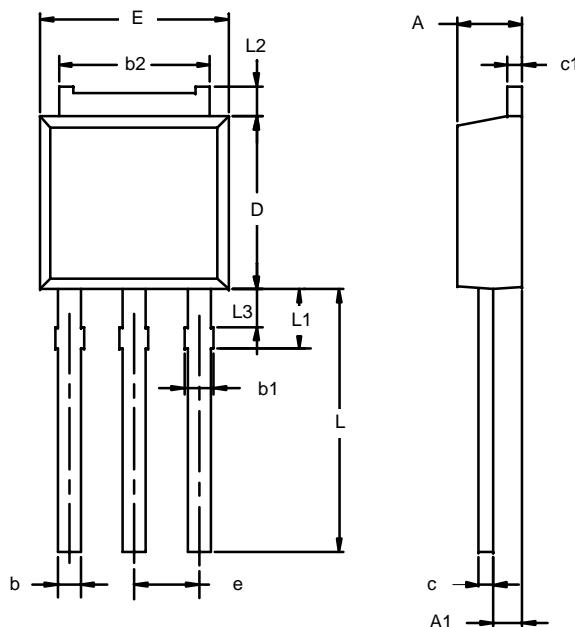
c. Independent of operating temperature.

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)


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**THERMAL RATINGS**


## TO-251AA (DPAK)



Note: Dimension L3 is for reference only.

Dim	MILLIMETERS		INCHES	
	Min	Max	Min	Max
<b>A</b>	2.21	2.38	0.087	0.094
<b>A1</b>	0.89	1.14	0.035	0.045
<b>b</b>	0.71	0.89	0.028	0.035
<b>b1</b>	0.76	1.14	0.030	0.045
<b>b2</b>	5.23	5.43	0.206	0.214
<b>c</b>	0.46	0.58	0.018	0.023
<b>c1</b>	0.46	0.58	0.018	0.023
<b>D</b>	5.97	6.22	0.235	0.245
<b>E</b>	6.48	6.73	0.255	0.265
<b>e</b>	2.28 BSC		0.090 BSC	
<b>L</b>	8.89	9.53	0.350	0.375
<b>L1</b>	1.91	2.28	0.075	0.090
<b>L2</b>	0.89	1.27	0.035	0.050
<b>L3</b>	1.15	1.52	0.045	0.060

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