IRFI540NPBF-VB Datasheet

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

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
100	0.034 at V_{GS} = 10 V	50[a]

FEATURES

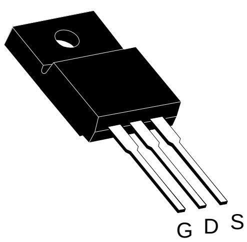
- Trench Power MOSFET
- 175 °C Junction Temperature
- Low Thermal Resistance Package
- 100 % R_g Tested

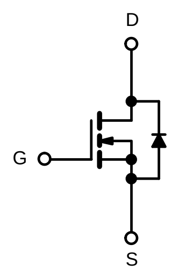
RoHS COMPLIANT

APPLICATIONS

- Isolated DC/DC Converters

TO-220 FULLPAK





N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS T_C = 25 °C, unless otherwise noted				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-Source Voltage		V_{DS}	100	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 175 °C)	T_C = 25 °C	I_D	50[a]	A
	T_C = 125 °C		28[a]	
Pulsed Drain Current		I_{DM}	120	
Avalanche Current	L = 0.1 mH	I_{AS}	31	
Single Pulse Avalanche Energy[b]		E_{AS}	61	mJ
Maximum Power Dissipation[b]	T_C = 25 °C	P_D	360[c]	W
	T_A = 25 °C[d]		3.70	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 175	°C

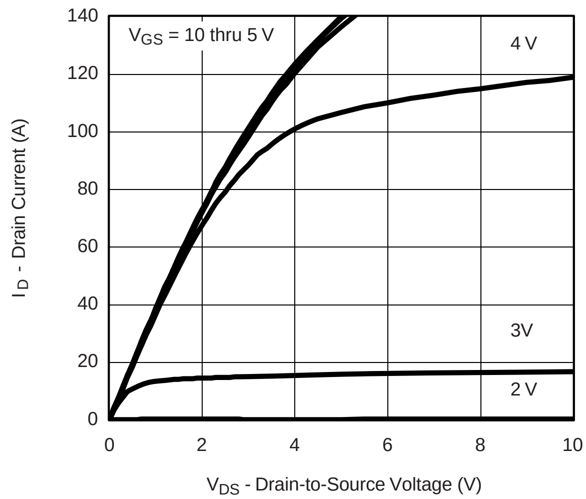
THERMAL RESISTANCE RATINGS				
Parameter		**Symbol**	**Limit**	**Unit**
Junction-to-Ambient	PCB Mount (TO-263)[d]	R_{thJA}	40	°C/W
Junction-to-Case (Drain)		R_{thJC}	0.4	

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

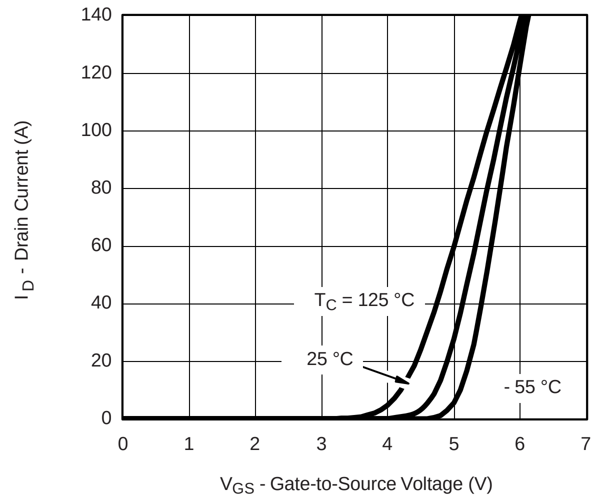
SPECIFICATIONS T_J = 25 °C, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{DS} = 0 V, I_D = 250 µA	100			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, I_D = 250 µA	1.5		2.5	V
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 100 V, V_{GS} = 0 V			1	µA
		V_{DS} = 100 V, V_{GS} = 0 V, T_J = 125 °C			50	
		V_{DS} = 100 V, V_{GS} = 0 V, T_J = 175 °C			250	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \geq 5$ V, V_{GS} = 10 V	120			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 30 A		0.034		Ω
		V_{GS} = 10 V, I_D = 30 A, T_J = 125 °C		0.063		
		V_{GS} = 10 V, I_D = 30 A, T_J = 175 °C		0.084		
Forward Transconductance[a]	g_{fs}	V_{DS} = 15 V, I_D = 30 A	25			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		5100		pF
Output Capacitance	C_{oss}			480		
Reverse Transfer Capacitance	C_{rss}			210		
Total Gate Charge[c]	Q_g	V_{DS} = 100 V, V_{GS} = 10 V, I_D = 65 A		90	130	nC
Gate-Source Charge[c]	Q_{gs}			23		
Gate-Drain Charge[c]	Q_{gd}			34		
Gate Resistance	R_g		0.5	1.7	3.3	Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 100 V, R_L = 1.5 Ω $I_D \cong$ 65 A, V_{GEN} = 10 V, R_g = 2.5 Ω		24	35	ns
Rise Time[c]	t_r			220	330	
Turn-Off Delay Time[c]	$t_{d(off)}$			45	70	
Fall Time[c]	t_f			200	300	
Source-Drain Diode Ratings and Characteristics T_C = 25 °C[b]						
Continuous Current	I_S			50		A
Pulsed Current	I_{SM}			120		
Forward Voltage[a]	V_{SD}	I_F = 65 A, V_{GS} = 0 V		1.0	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 50 A, di/dt = 100 A/µs		130	200	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			8	12	A
Reverse Recovery Charge	Q_{rr}			0.52	1.2	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.

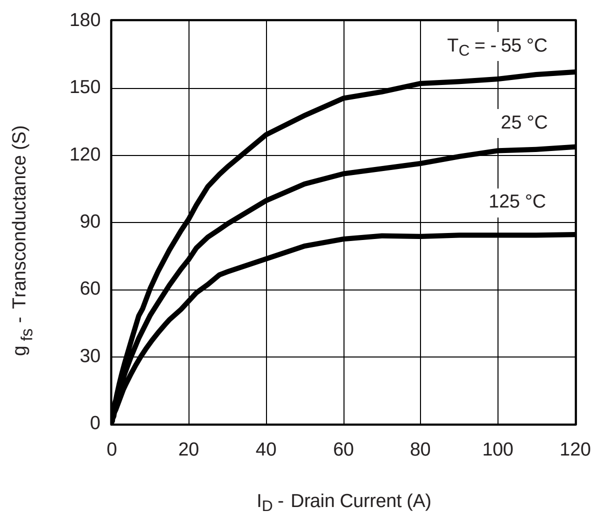
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



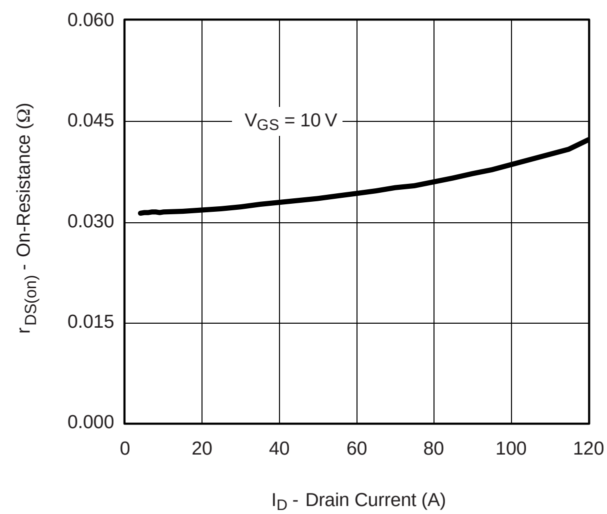
Output Characteristics



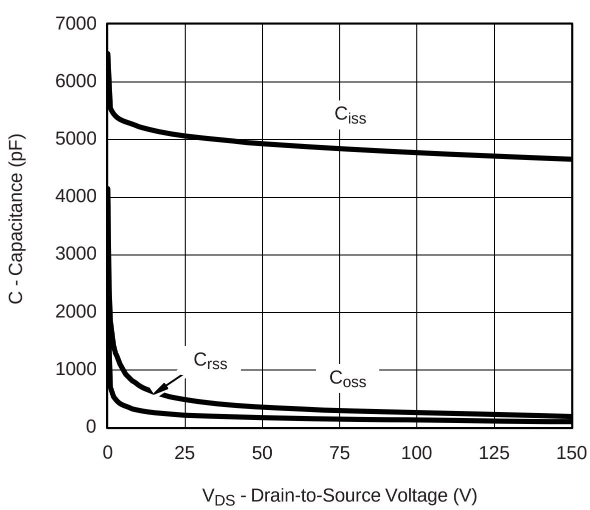
Transfer Characteristics



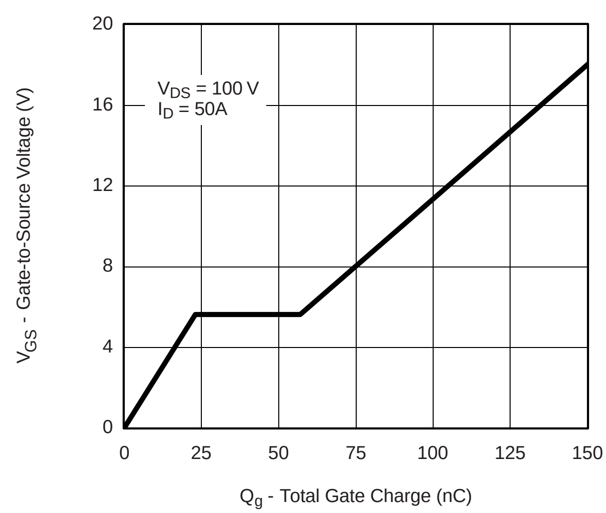
Transconductance



On-Resistance vs. Drain Current

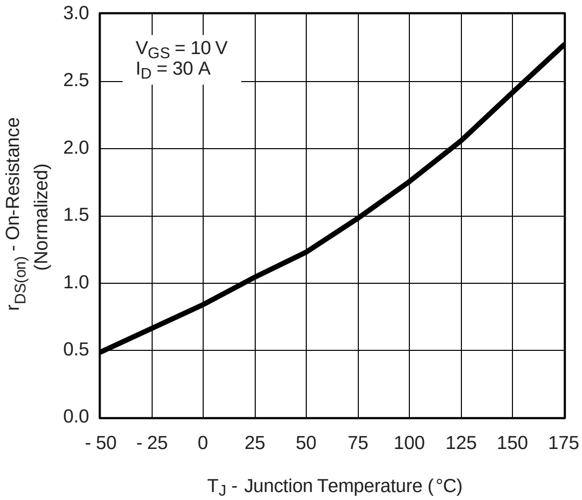


Capacitance

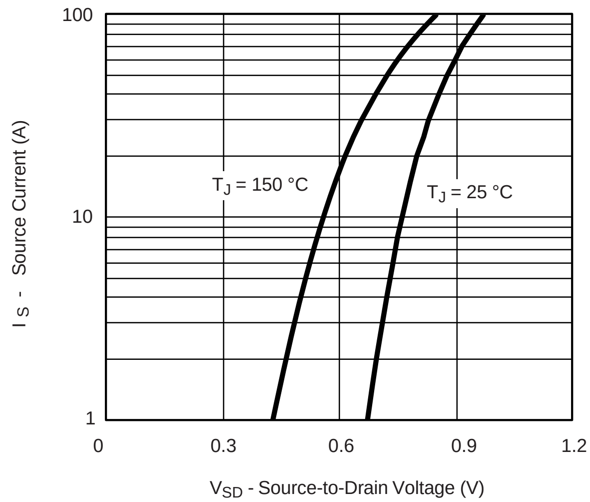


Gate Charge

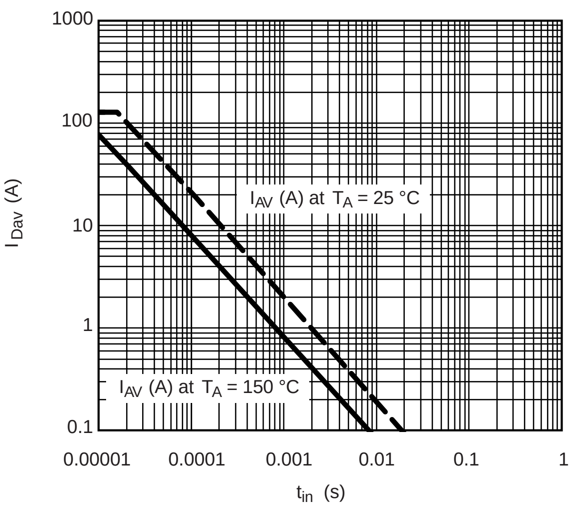
TYPICAL CHARACTERISTICS 25 °C, unless otherwise noted



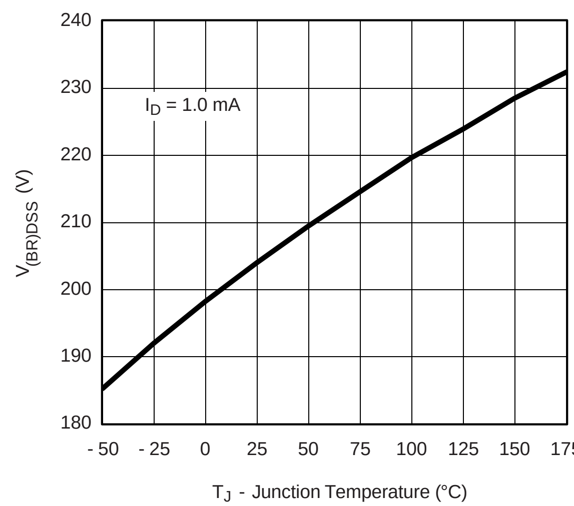
On-Resistance vs. Junction Temperature



Source-Drain Diode Forward Voltage

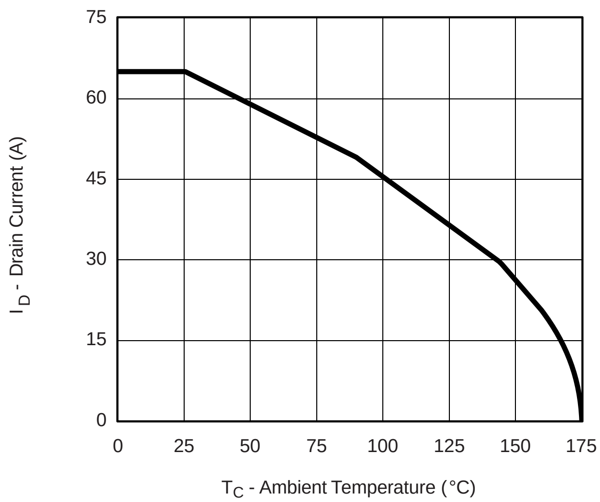


Avalanche Current vs. Time

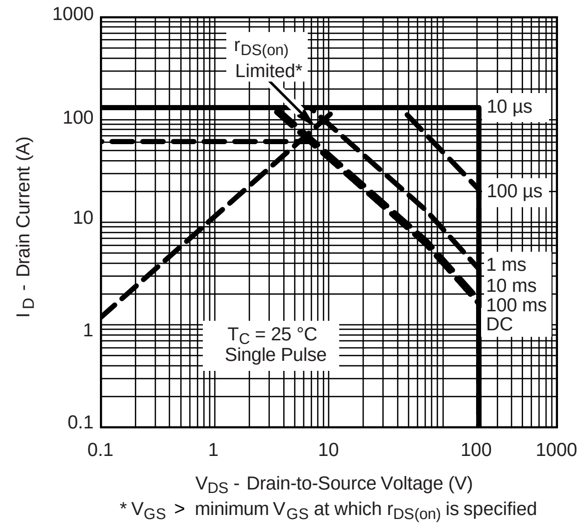


Drain Source Breakdown vs. Junction Temperature

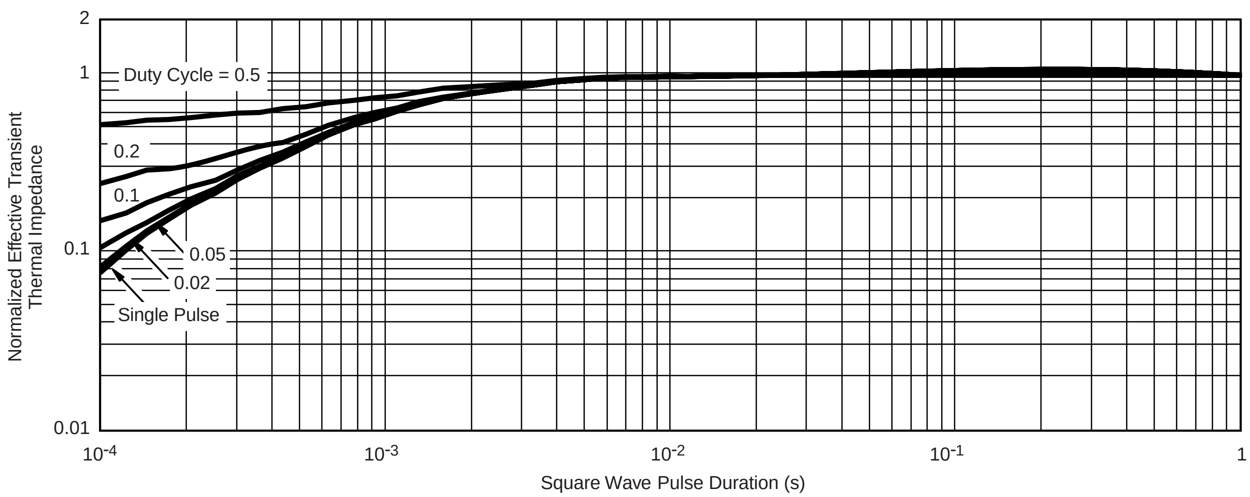
THERMAL RATINGS



Maximum Avalanche and Drain Current vs. Case Temperature

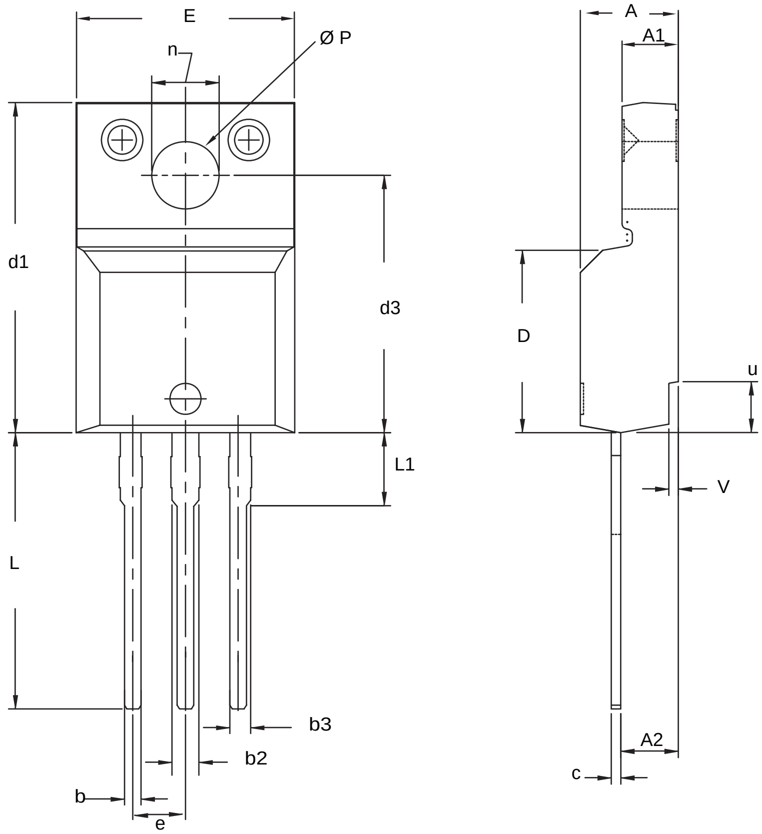


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-220 FULLPAK (HIGH VOLTAGE)



	MILLIMETERS		INCHES	
DIM.	MIN.	MAX.	MIN.	MAX.
A	4.570	4.830	0.180	0.190
A1	2.570	2.830	0.101	0.111
A2	2.510	2.850	0.099	0.112
b	0.622	0.890	0.024	0.035
b2	1.229	1.400	0.048	0.055
b3	1.229	1.400	0.048	0.055
c	0.440	0.629	0.017	0.025
D	8.650	9.800	0.341	0.386
d1	15.88	16.120	0.622	0.635
d3	12.300	12.920	0.484	0.509
E	10.360	10.630	0.408	0.419
e	2.54 BSC		0.100 BSC	
L	13.200	13.730	0.520	0.541
L1	3.100	3.500	0.122	0.138
n	6.050	6.150	0.238	0.242
Ø P	3.050	3.450	0.120	0.136
u	2.400	2.500	0.094	0.098
v	0.400	0.500	0.016	0.020
ECN: X09-0126-Rev. B, 26-Oct-09 DWG: 5972				

Notes

1. To be used only for process drawing.
2. These dimensions apply to all TO-220, FULLPAK leadframe versions 3 leads.
3. All critical dimensions should C meet C_{pk} > 1.33.
4. All dimensions include burrs and plating thickness.
5. No chipping or package damage.

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