IRF9541-VB Datasheet

P-Channel 100 V (D-S) MOSFET

PRODUCT SUMMARY		
V_{DS}	-100	V
$R_{DS(on)}$ V_{GS} = 10 V	167	mΩ
$R_{DS(on)}$ V_{GS} = 4.5 V	178	mΩ
I_D	-18	A
Configuration	Single	

FEATURES

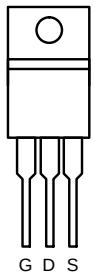
- **Halogen-free According to IEC 61249-2-21 Definition**
- Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2002/95/EC

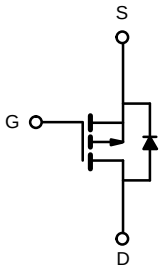
RoHS COMPLIANT

APPLICATIONS

- Power Switch
- Load Switch in High Current Applications
- DC/DC Converters

TO-220AB





P-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 = 150 °C)	T_C = 25 °C	I_D	- 18	A
	T_C = 70 °C		- 13	
Pulsed Drain Current (t = 300 µs)		I_{DM}	- 100	
Avalanche Current		I_{AS}	- 10	
Single Avalanche Energy[a]	L = 0.1 mH	E_{AS}	31	mJ
Maximum Power Dissipation[a]	T_C = 25 °C	P_D	11.7[b]	W
	T_A = 25 °C[c]		1.1	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	- 55 to 150	°C

THERMAL RESISTANCE RATINGS			
Parameter	**Symbol**	**Limit**	**Unit**
Junction-to-Ambient (PCB Mount)[c]	R_{thJA}	60	°C/W
Junction-to-Case (Drain)	R_{thJC}	9	

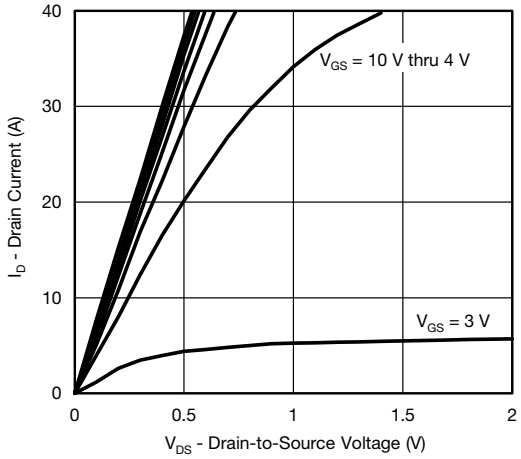
Notes:
a. Duty cycle ≤ 1 %.
b. See SOA curve for voltage derating.
c. When mounted on 1" square PCB (FR-4 material).

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)						
Parameter	**Symbol**	**Test Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static						
Drain-Source Breakdown Voltage	V_{DS}	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		- 2.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ± 20 V			± 250	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = - 60 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 = 150 °C			- 250	
On-State Drain Current[a]	$I_{D(on)}$	$V_{DS} \leq$ - 10 V, V_{GS} = - 10 V	- 18			A
Drain-Source On-State Resistance[a]	$R_{DS(on)}$	V_{GS} = - 10 V, I_D = - 14 A		167		mΩ
		V_{GS} = - 4.5 V, I_D = - 12 A		178		
Forward Transconductance[a]	g_{fs}	V_{DS} = - 20 V, I_D = - 14 A		20		S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = - 20 V, f = 1 MHz		1460		pF
Output Capacitance	C_{oss}			330		
Reverse Transfer Capacitance	C_{rss}			280		
Total Gate Charge[c]	Q_g	V_{DS} = - 20 V, V_{GS} = - 10 V, I_D = - 14 A		67	100	nC
Gate-Source Charge[c]	Q_{gs}			13.5		
Gate-Drain Charge[c]	Q_{gd}			14		
Gate Resistance	R_g	f = 1 MHz	0.5	2.5	5	Ω
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = - 20 V, R_L = 2 Ω $I_D \cong$ - 10 A, V_{GEN} = - 10 V, R_g = 1 Ω		10	20	ns
Rise Time[c]	t_r			11	20	
Turn-Off Delay Time[c]	$t_{d(off)}$			42	63	
Fall Time[c]	t_f			12	20	
Drain-Source Body Diode Ratings and Characteristics T_C = 25 °C[b]						
Continuous Current	I_S				- 18	A
Pulsed Current	I_{SM}				- 100	
Forward Voltage[a]	V_{SD}	I_F = - 10 A, V_{GS} = 0 V		- 0.8	- 1.5	V
Reverse Recovery Time	t_{rr}	I_F = - 10 A, dI/dt = 100 A/µs		38	57	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			2.3	3.5	A
Reverse Recovery Charge	Q_{rr}			40	60	nC

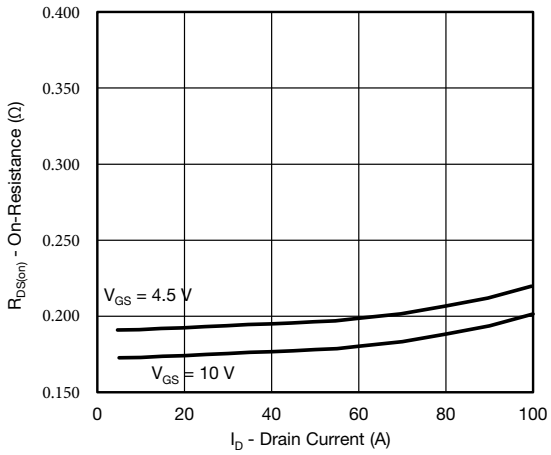
Notes:
a. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2 %.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

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.

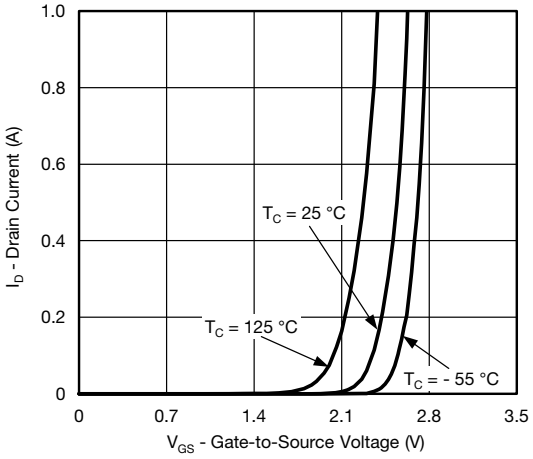
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



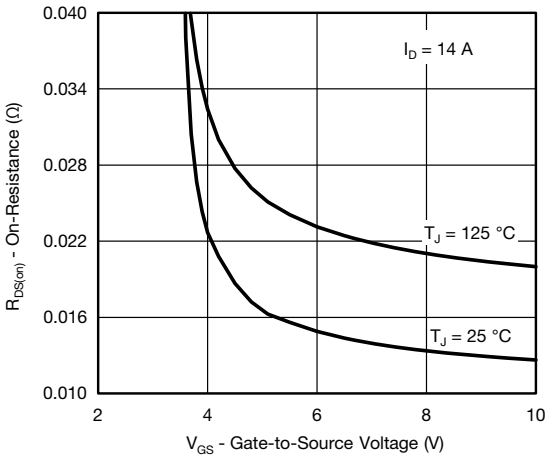
Output Characteristics



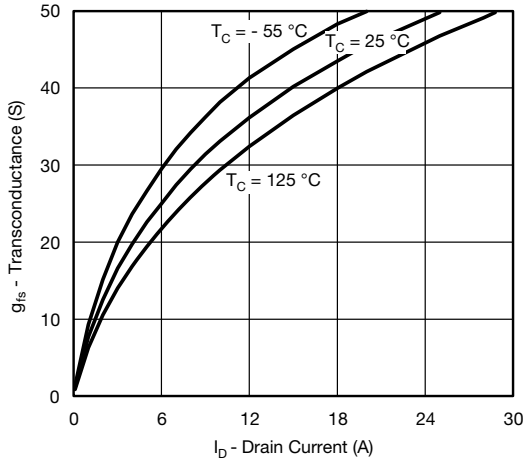
On-Resistance vs. Drain Current



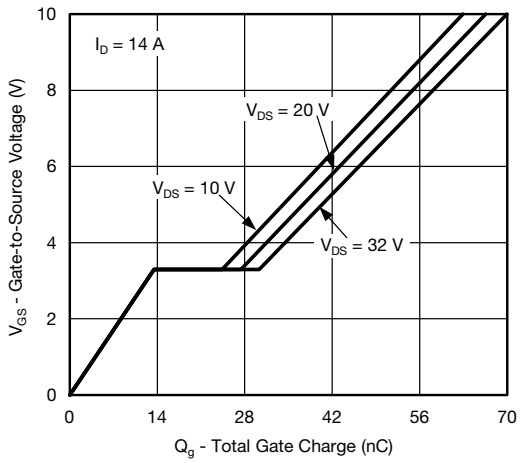
Transfer Characteristics



On-Resistance vs. Gate-to-Source Voltage

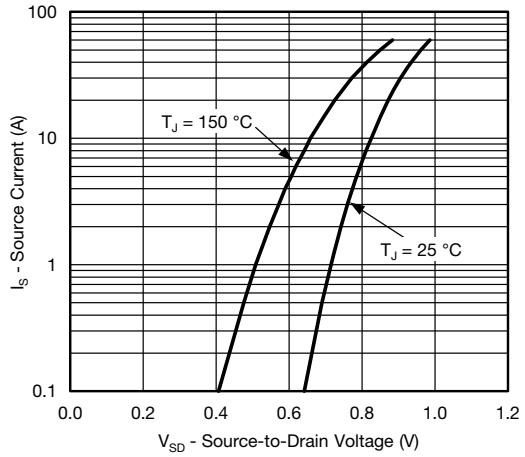


Transconductance

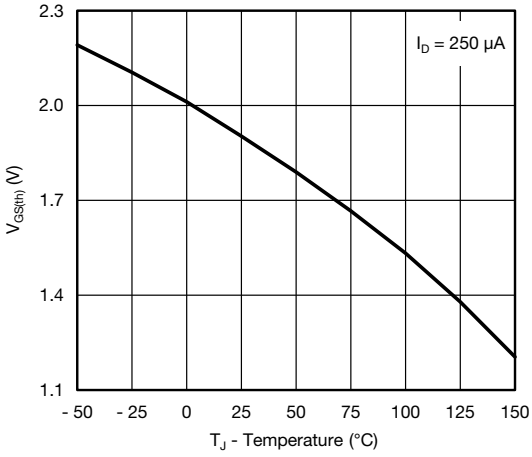


Gate Charge

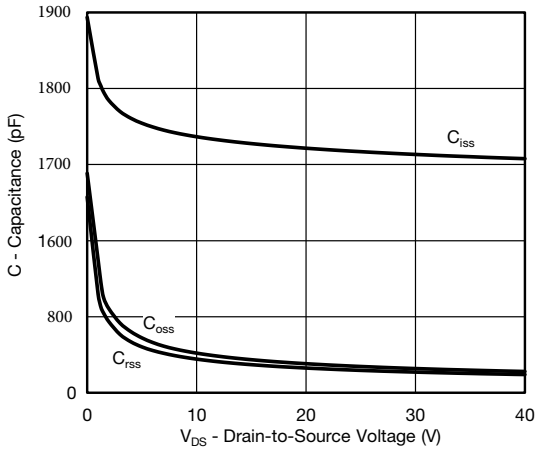
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



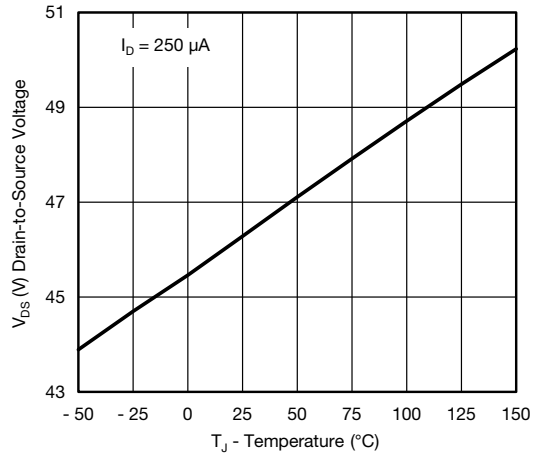
Source-Drain Diode Forward Voltage



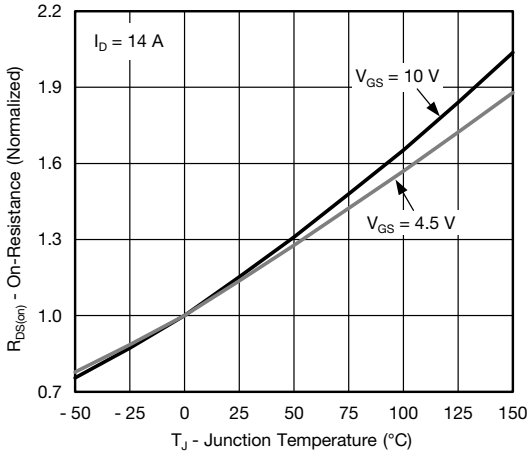
Threshold Voltage



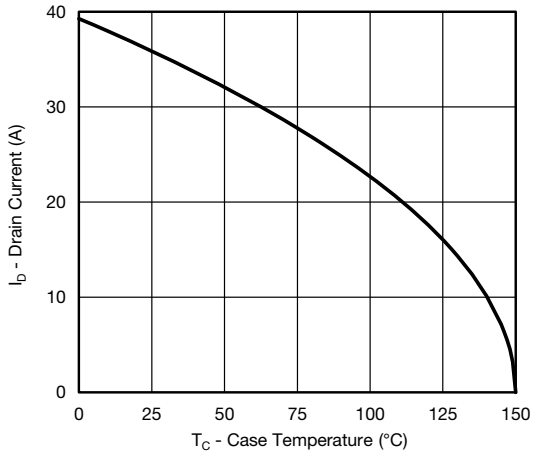
Capacitance



Drain Source Breakdown vs. Junction Temperature

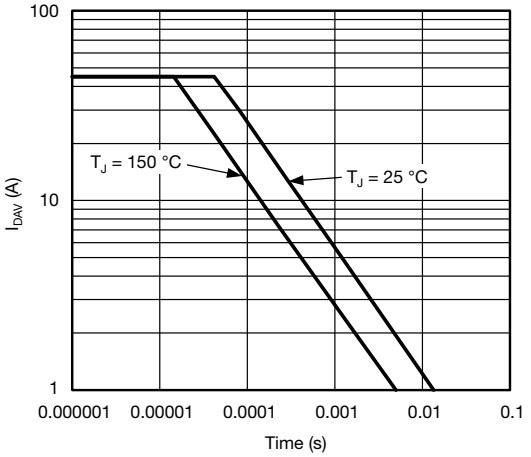


On-Resistance vs. Junction Temperature

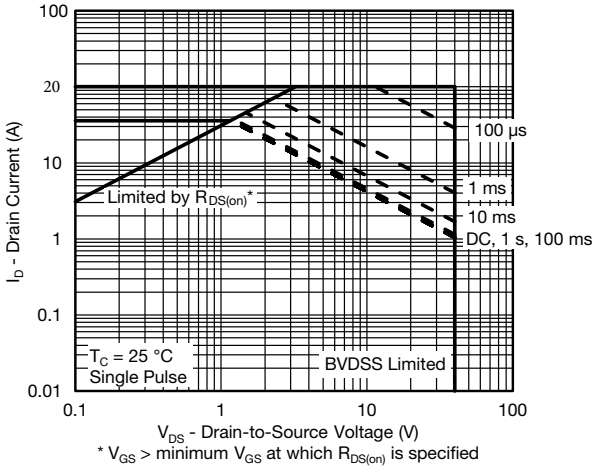


Current Derating

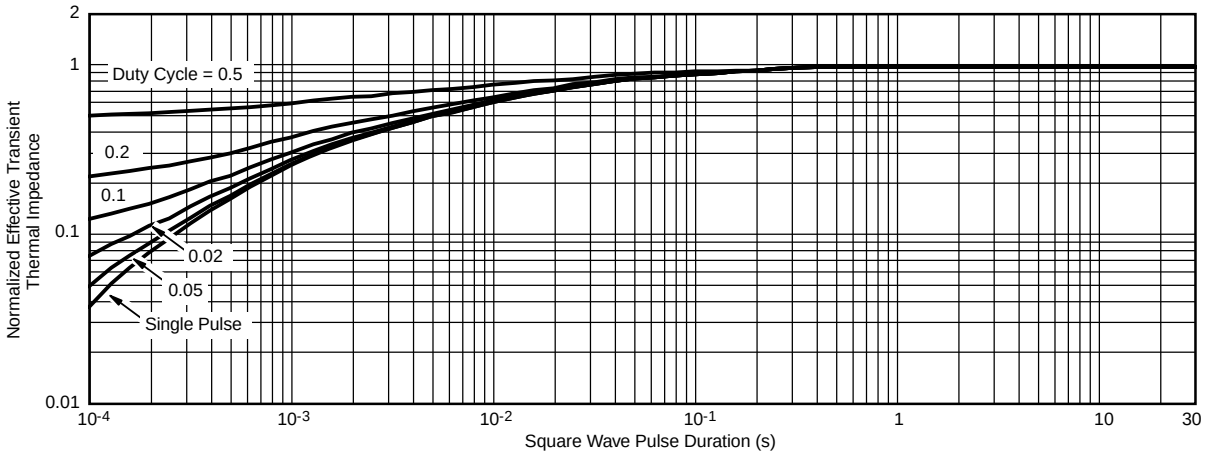
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Single Pulse Avalanche Current Capability vs. Time

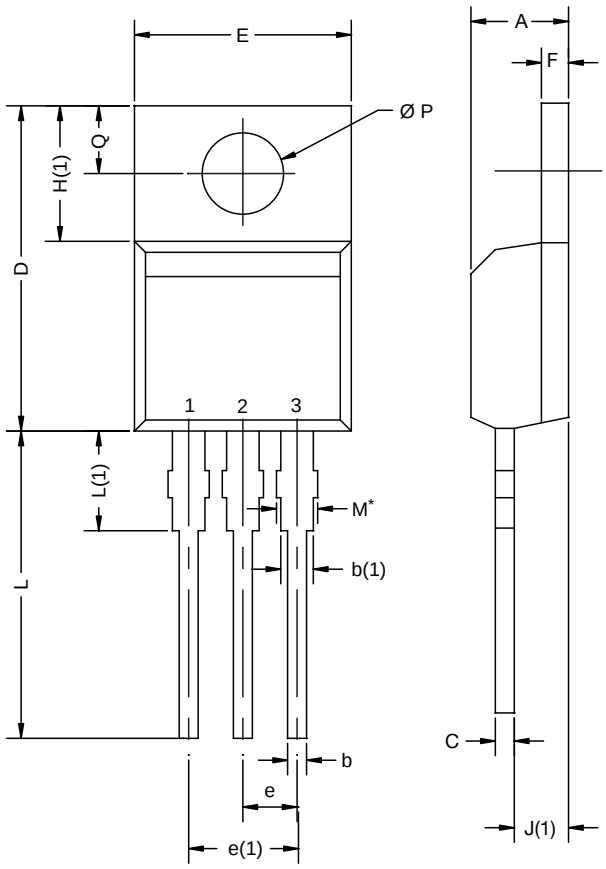


Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

TO-220AB



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
Ø P	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118
ECN: X12-0208-Rev. N, 08-Oct-12 DWG: 5471				

Notes

* M = 1.32 mm to 1.62 mm (dimension including protrusion) Heatsink hole for HVM

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