IRL3502PBF-VB Datasheet

N-Channel 20-V (D-S) MOSFET

PRODUCT SUMMARY		
$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)[a]
20	0.004@ V_{GS} = 4.5 V	100
	0.005@ V_{GS} = 2.5 V	95

FEATURES

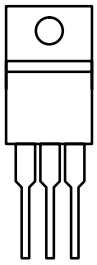
- Trench Power MOSFET
- 100 % R_g and UIS Tested
- Compliant to RoHS Directive 2011/65/EU

RoHS COMPLIANT

APPLICATIONS

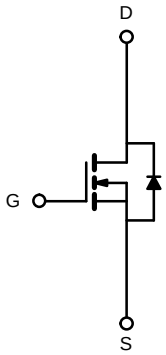
- OR-ing
- Server
- DC/DC

TO-220AB



G D S

Top View



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C UNLESS OTHERWISE NOTED)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 12	
Continuous Drain Current (T_J = 175°C)	T_C = 25°C	I_D	100	A
	T_C = 100°C		85	
Pulsed Drain Current		I_{DM}	260	
Avalanche Current		I_{AR}	35	
Repetitive Avalanche Energy[b]	L = 0.1 mH	E_{AR}	45	mJ
Power Dissipation	T_C = 25°C	P_D	125[a]	W
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)[c]	R_{thJA}	40	°C/W
	Free Air (TO-220AB)		62.5	
Junction-to-Case		R_{thJC}	1.25	

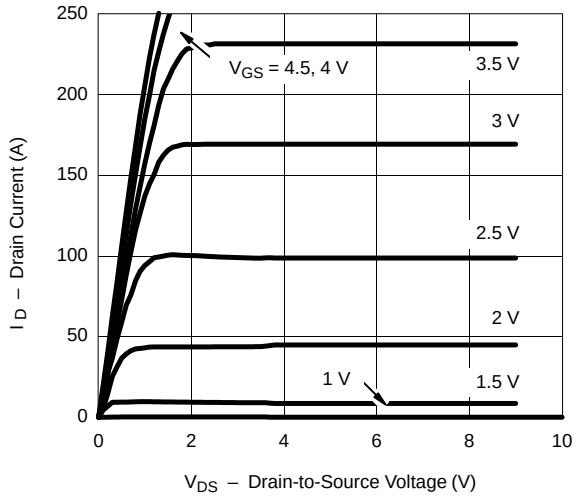
Notes:
a. See SOA curve for voltage derating.
b. Duty cycle ≤ 1%.
c. When mounted on 1" square PCB (FR-4 material).

MOSFET SPECIFICATIONS (T_J =25°C UNLESS OTHERWISE NOTED)						
Parameter	**Symbol**	**Test Condition**	**Min**	**Typ**	**Max**	**Unit**
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA	20			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_{DS} = 250 μA	0.5		1.5	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±12 V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 20 V, V_{GS} = 0 V			1	μA
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 125°C			50	
		V_{DS} = 20 V, V_{GS} = 0 V, T_J = 175°C			150	
On-State Drain Current[a]	$I_{D(on)}$	V_{DS} = 5 V, V_{GS} = 4.5 V	120			A
Drain-Source On-State Resistance[a]	$r_{DS(on)}$	V_{GS} = 4.5 V, I_D = 30 A		0.004		Ω
		V_{GS} = 4.5 V, I_D = 30 A, T_J = 125°C		0.007		
		V_{GS} = 4.5 V, I_D = 30 A, T_J = 175°C		0.010		
		V_{GS} = 2.5 V, I_D = 20 A		0.005		
Forward Transconductance[a]	g_{fs}	V_{DS} = 5 V, I_D = 30 A	20			S
Dynamic[b]						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 20 V, f = 1 MHz		6000		pF
Output Capacitance	C_{oss}			1100		
Reversen Transfer Capacitance	C_{rss}			600		
Total Gate Charge[c]	Q_g	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 85 A		65	130	nC
Gate-Source Charge[c]	Q_{gs}			13		
Gate-Drain Charge[c]	Q_{gd}			14		
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 10 V, R_L = 0.12 Ω I_D ≃ 85 A, V_{GEN} = 4.5 V, R_G = 2.5 Ω		25	40	ns
Rise Time[c]	t_r			120	180	
Turn-Off Delay Time[c]	$t_{d(off)}$			80	120	
Fall Time[c]	t_f			100	150	
Source-Drain Diode Ratings and Characteristics (T_C = 25°C)[b]						
Pulsed Current	I_{SM}				240	A
Forward Voltage[a]	V_{SD}	I_F = 100 A, V_{GS} = 0 V		1.2	1.5	V
Reverse Recovery Time	t_{rr}	I_F = 50 A, di/dt = 100 A/μs		45	100	ns

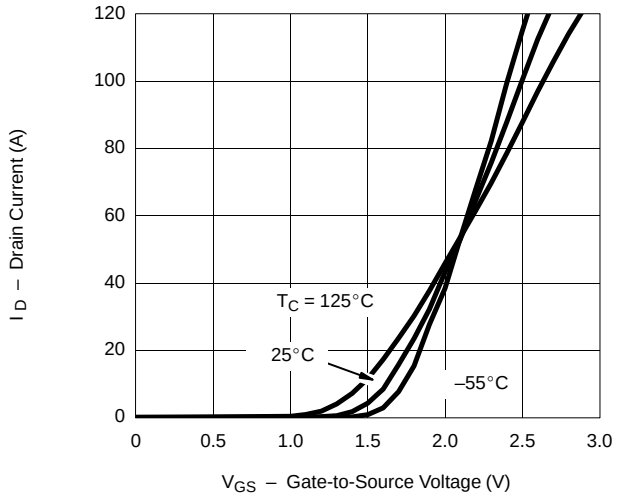
Notes:
a. Pulse test; pulse width ≤ 300 μs, duty cycle ≤ 2%.
b. Guaranteed by design, not subject to production testing.
c. Independent of operating temperature.

TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

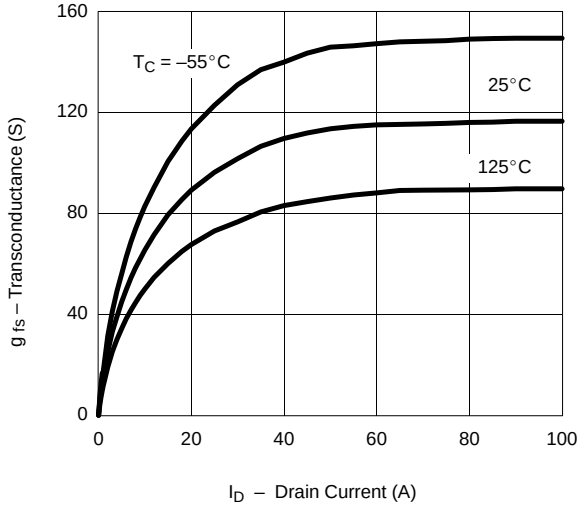
Output Characteristics



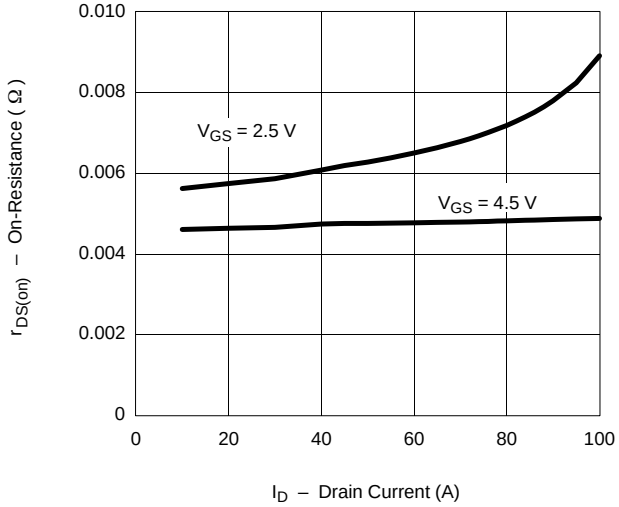
Transfer Characteristics



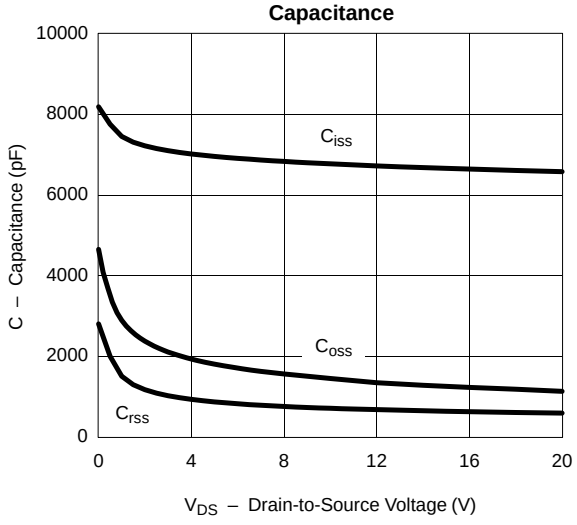
Transconductance



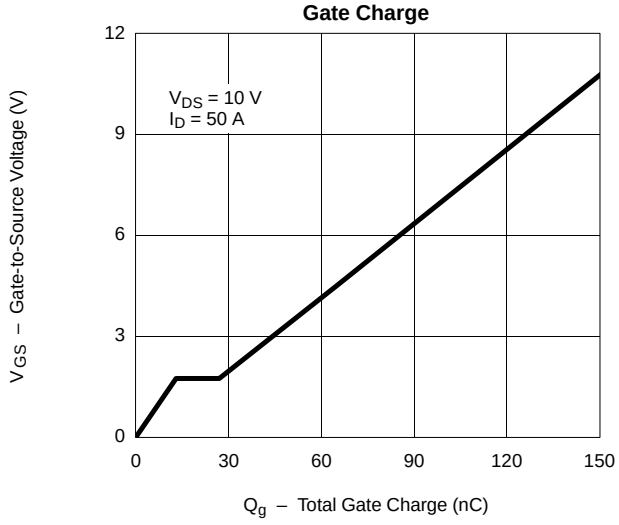
On-Resistance vs. Drain Current



Capacitance

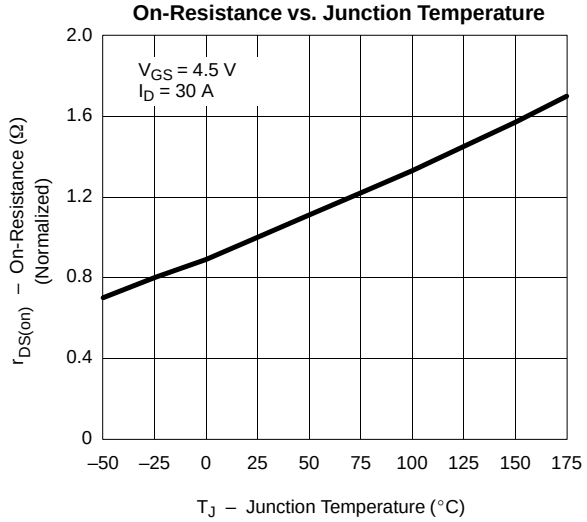


Gate Charge

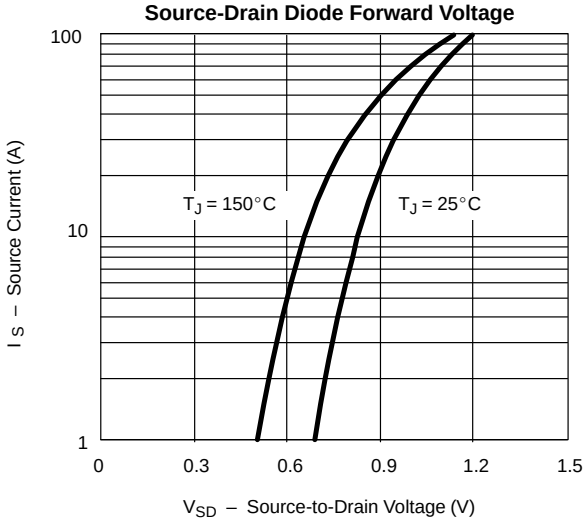


TYPICAL CHARACTERISTICS (25°C UNLESS NOTED)

On-Resistance vs. Junction Temperature

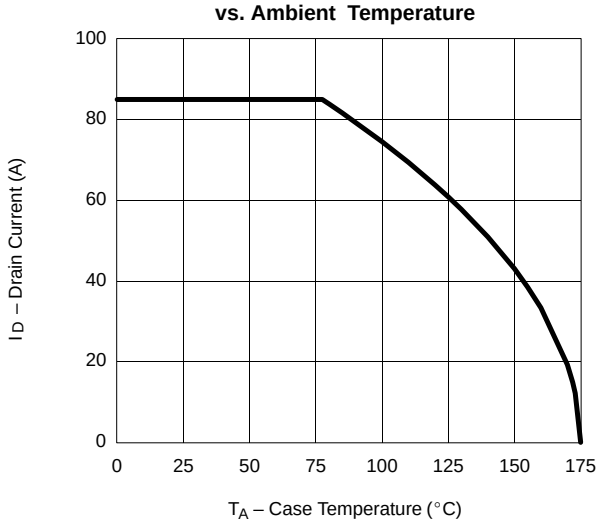


Source-Drain Diode Forward Voltage

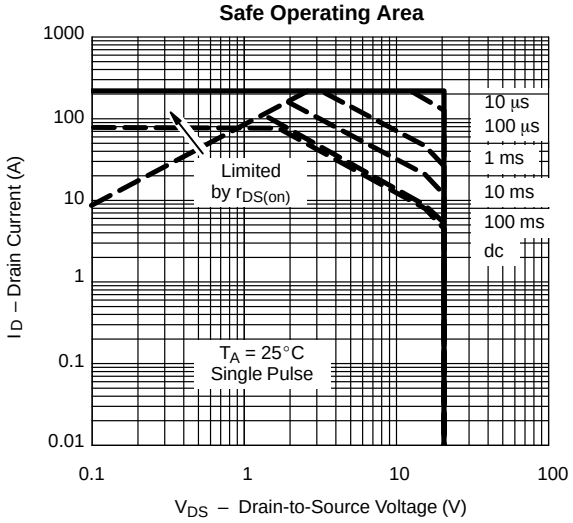


THERMAL RATINGS

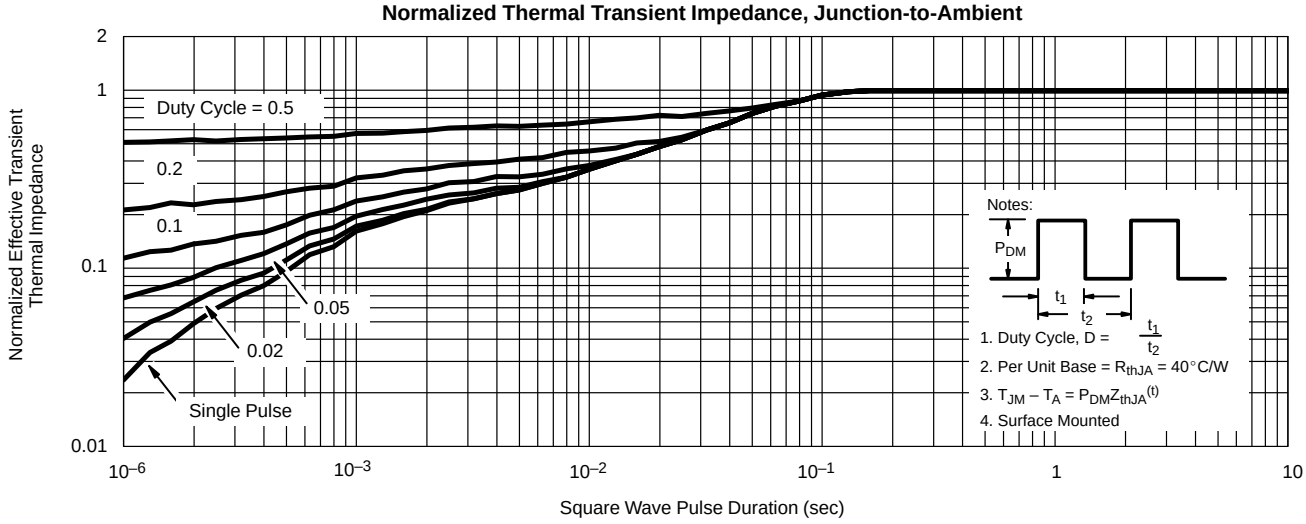
Maximum Avalanche Drain Current vs. Ambient Temperature



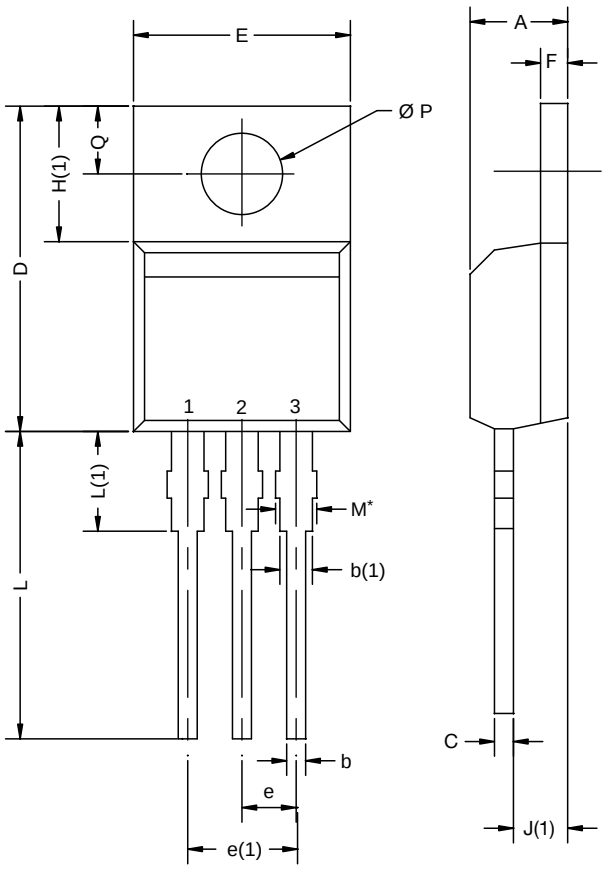
Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Ambient



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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