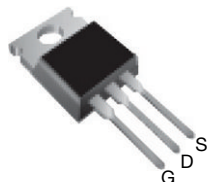


Power MOSFET

TO-220AB


N-Channel MOSFET

FEATURES

- Low figure-of-merit (FOM) $R_{on} \times Q_g$
- Low effective capacitance ($C_{o(er)}$)
- Reduced switching and conduction losses
- Avalanche energy rated (UIS)
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912



RoHS
COMPLIANT
HALOGEN
FREE

APPLICATIONS

- Server and telecom power supplies
- Switch mode power supplies (SMPS)
- Power factor correction power supplies (PFC)
- Lighting
 - High-intensity discharge (HID)
 - Fluorescent ballast lighting
- Industrial
 - Welding
 - Induction heating
 - Motor drives
 - Battery chargers
 - Solar (PV inverters)

PRODUCT SUMMARY

V_{DS} (V) at T_J max.	450	
$R_{DS(on)}$ typ. (Ω) at 25 °C	$V_{GS} = 10$ V	0.550
Q_g max. (nC)	39	
Q_{gs} (nC)	8	
Q_{gd} (nC)	11	
Configuration	Single	

ORDERING INFORMATION

Package	TO-220AB
Lead (Pb)-free and halogen-free	IRF740HPBF

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

PARAMETER				SYMBOL	LIMIT	UNIT
Drain-source voltage				V _{DS}	400	V
Gate-source voltage				V _{GS}	± 30	
Continuous drain current (T _J = 150 °C)	V _{GS} at 10 V	T _C = 25 °C	I _D	9.4	A	
		T _C = 100 °C		6.0		
Pulsed drain current ^a			I _{DM}	20		
Linear derating factor				1.0	W/°C	
Single pulse avalanche energy ^b			E _{AS}	56	mJ	
Maximum power dissipation			P _D	125	W	
Operating junction and storage temperature range			T _J , T _{stg}	-55 to +150	°C	
Drain-source voltage slope		T _J = 125 °C	dv/dt	100	V/ns	
Reverse diode dv/dt ^d				0.6		
Soldering recommendations (peak temperature) ^c	For 10 s			260	°C	

Notes

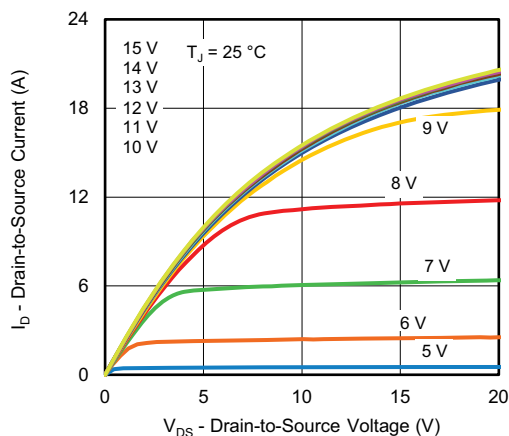
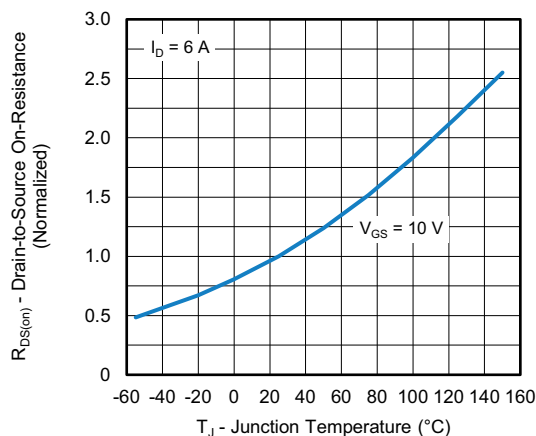
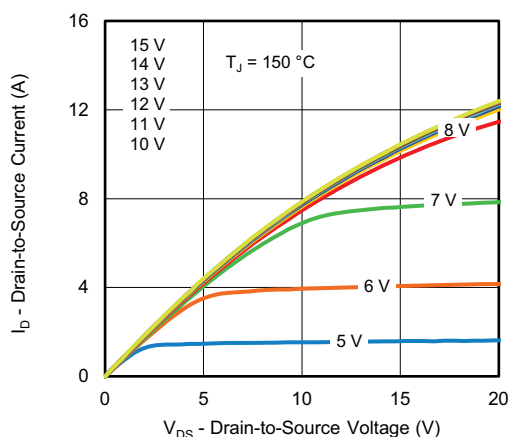
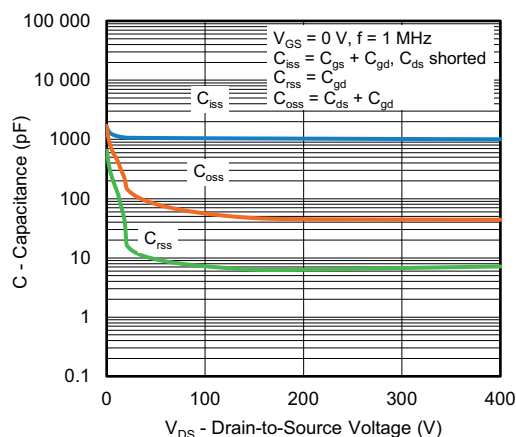
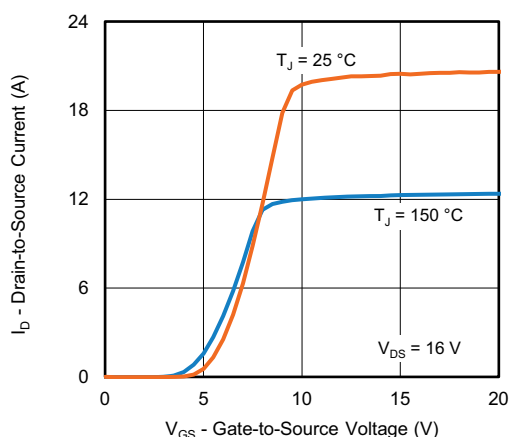
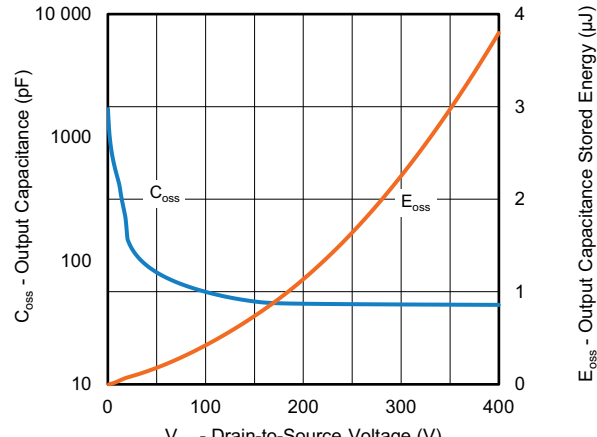
- Repetitive rating; pulse width limited by maximum junction temperature
- $V_{DD} = 120$ V, starting $T_J = 25$ °C, $L = 9.1$ mH, $R_g = 25$ Ω , $I_{AS} = 3.5$ A
- 1.6 mm from case
- $I_{SD} \leq I_D$, $di/dt = 100$ A/ μ s, starting $T_J = 25$ °C

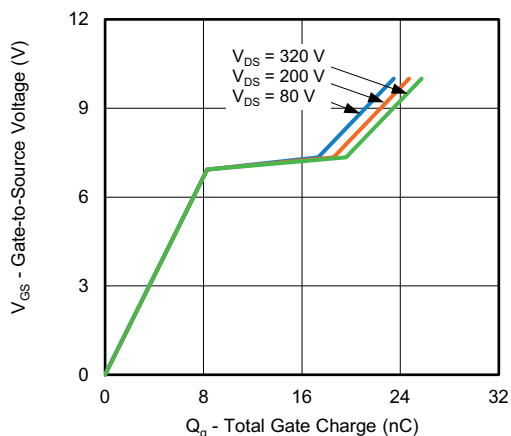
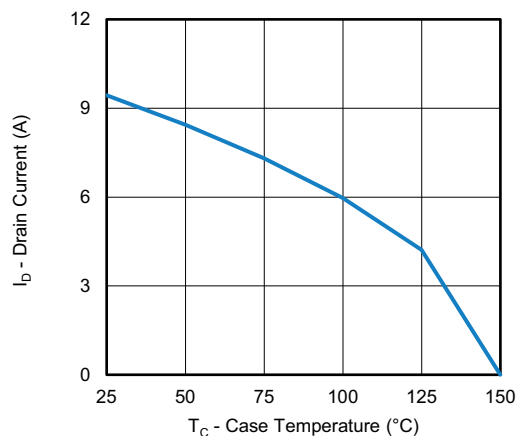
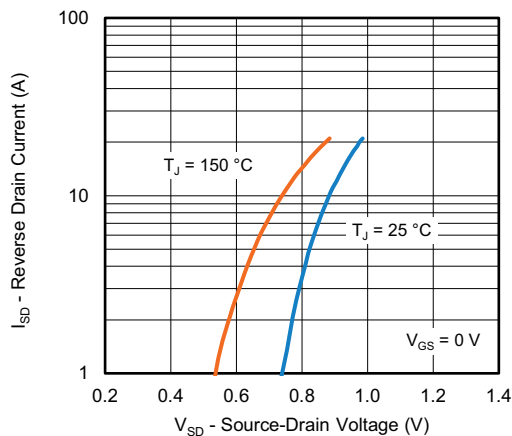
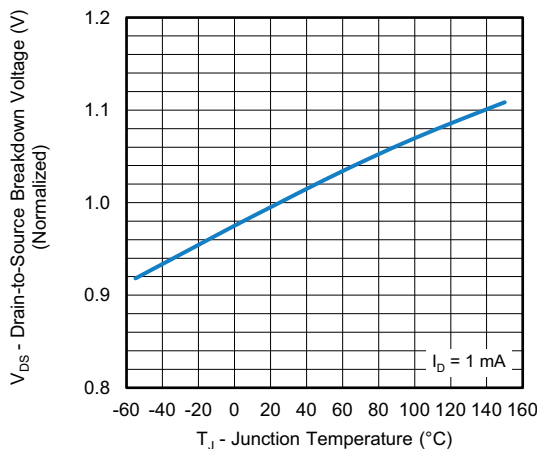
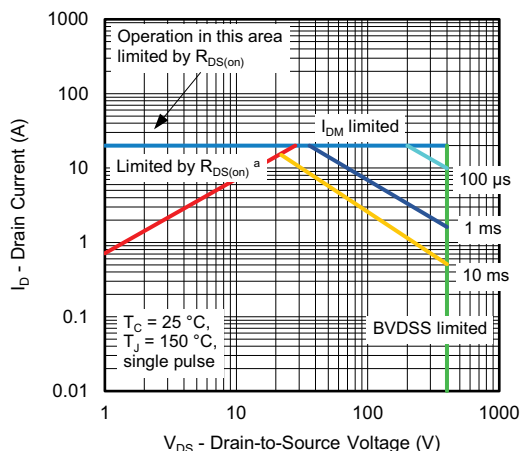
**THERMAL RESISTANCE RATINGS**

PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R_{thJA}	-	62	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	1.0	

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static						
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	400	-	-	V
V_{DS} temperature coefficient	$\Delta V_{DS}/T_J$	Reference to $25\text{ }^{\circ}\text{C}$, $I_D = 1\text{ mA}$	-	0.41	-	V/ $^{\circ}\text{C}$
Gate-source threshold voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2.0	-	4.0	V
Gate-source leakage	I_{GSS}	$V_{GS} = \pm 20\text{ V}$	-	-	± 100	nA
		$V_{GS} = \pm 30\text{ V}$	-	-	± 1	μA
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 400\text{ V}$, $V_{GS} = 0\text{ V}$	-	-	1	μA
		$V_{DS} = 320\text{ V}$, $V_{GS} = 0\text{ V}$, $T_J = 125\text{ }^{\circ}\text{C}$	-	-	100	
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}$, $I_D = 4\text{ A}$	-	0.478	0.550	Ω
Forward transconductance ^a	g_{fs}	$V_{DS} = 50\text{ V}$, $I_D = 6\text{ A}$	-	3.3	-	S
Dynamic						
Input capacitance	C_{iss}	$V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$	-	1057	-	pF
Output capacitance	C_{oss}		-	124	-	
Reverse transfer capacitance	C_{rss}		-	14	-	
Effective output capacitance, energy related ^a	$C_{o(er)}$	$V_{DS} = 0\text{ V to } 320\text{ V}$, $V_{GS} = 0\text{ V}$	-	49	-	
Effective output capacitance, time related ^b	$C_{o(tr)}$		-	85	-	
Total gate charge	Q_g	$V_{GS} = 10\text{ V}$, $I_D = 6\text{ A}$, $V_{DS} = 320\text{ V}$	-	26	39	nC
Gate-source charge	Q_{gs}		-	8	-	
Gate-drain charge	Q_{gd}		-	11	-	
Turn-on delay time	$t_{d(on)}$	$V_{DD} = 320\text{ V}$, $I_D = 6\text{ A}$, $V_{GS} = 10\text{ V}$, $R_g = 9.1\text{ }\Omega$	-	16	32	ns
Rise time	t_r		-	23	46	
Turn-off delay time	$t_{d(off)}$		-	26	52	
Fall time	t_f		-	17	34	
Gate input resistance	R_g	$f = 1\text{ MHz}$, open drain	0.5	1.0	2.0	Ω
Drain-Source Body Diode Characteristics						
Continuous source-drain diode current	I_S	MOSFET symbol showing the integral reverse p - n junction diode 	-	-	9.4	A
Pulsed diode forward current	I_{SM}		-	-	20	
Diode forward voltage	V_{SD}	$T_J = 25\text{ }^{\circ}\text{C}$, $I_S = 6\text{ A}$, $V_{GS} = 0\text{ V}$	-	-	1.2	V
Reverse recovery time	t_{rr}	$T_J = 25\text{ }^{\circ}\text{C}$, $I_F = I_S = 6\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_R = 25\text{ V}$	-	229	882	ns
Reverse recovery charge	Q_{rr}		-	1.7	5.8	μC
Reverse recovery current	I_{RRM}		-	14	-	A

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Fig. 1 - Typical Output Characteristics

Fig. 4 - Normalized On-Resistance vs. Temperature

Fig. 2 - Typical Output Characteristics

Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

Fig. 3 - Typical Transfer Characteristics

Fig. 6 - C_{oss} and E_{oss} vs. V_{DS}


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage

Fig. 10 - Maximum Drain Current vs. Case Temperature

Fig. 8 - Typical Source-Drain Diode Forward Voltage

Fig. 11 - Temperature vs. Drain-to-Source Voltage

Fig. 9 - Maximum Safe Operating Area
Note

a. $V_{GS} >$ minimum V_{GS} at which $R_{DS(on)}$ is specified

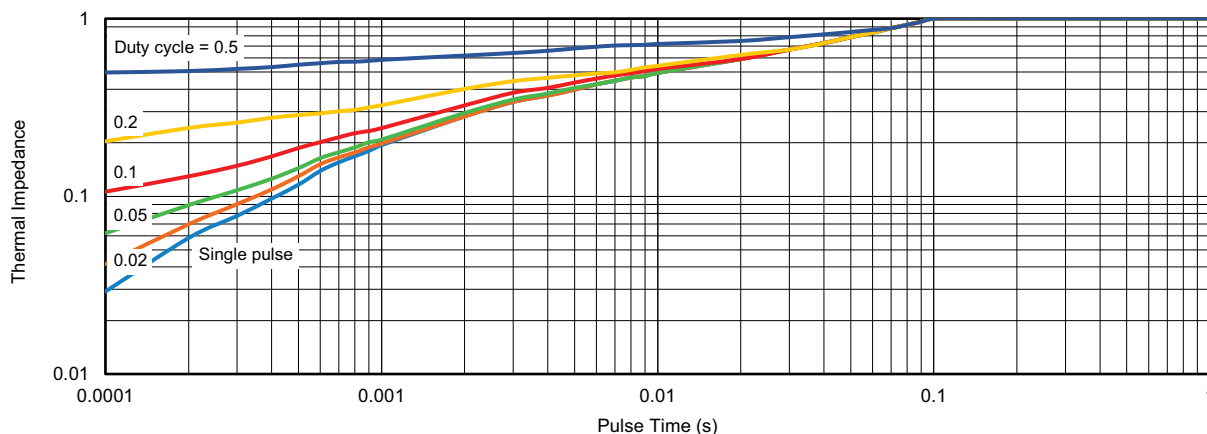
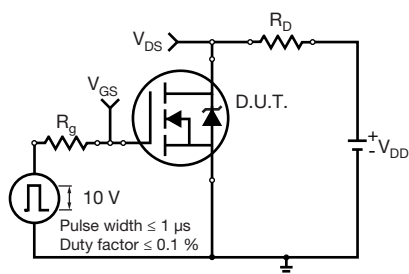
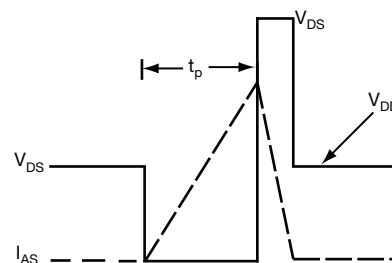

Fig. 12 - Normalized Transient Thermal Impedance, Junction-to-Case

Fig. 13 - Switching Time Test Circuit

Fig. 16 - Unclamped Inductive Waveforms

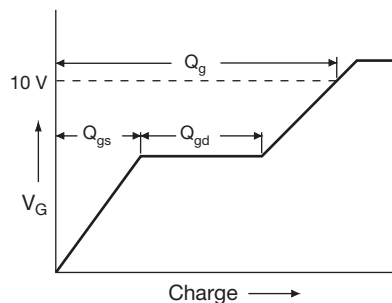
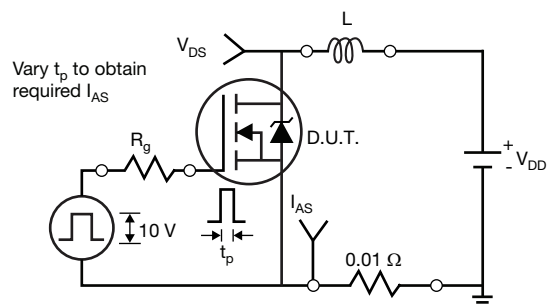
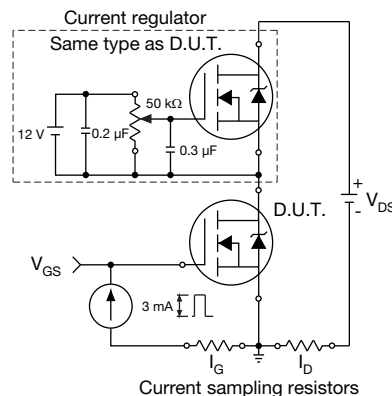
Fig. 14 - Switching Time Waveforms

Fig. 17 - Basic Gate Charge Waveform

Fig. 15 - Unclamped Inductive Test Circuit

Fig. 18 - Gate Charge Test Circuit


Fig. 19 - For N-Channel

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