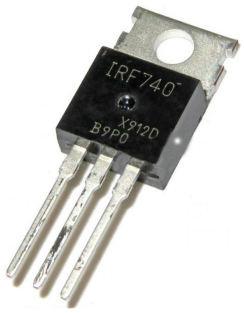

VISHAY IRF740B D Series Power MOSFET Owner's Manual

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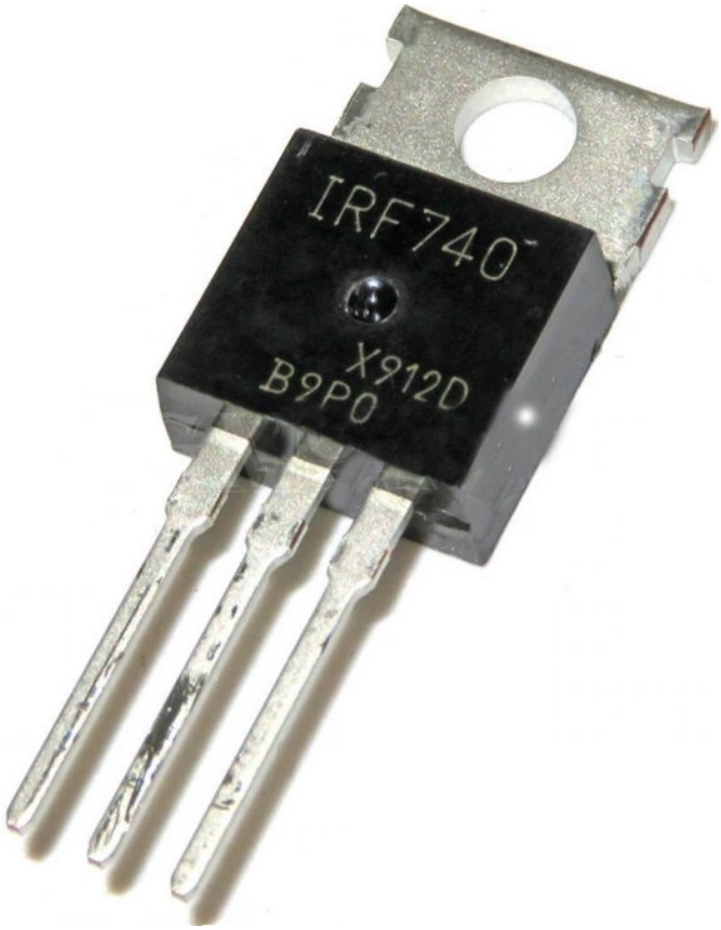
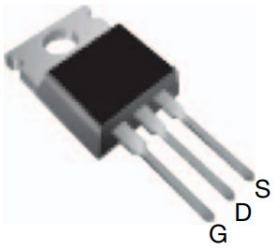
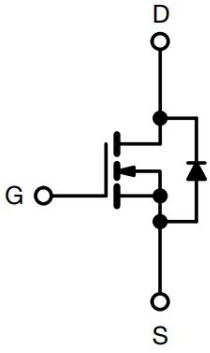


PRODUCT SUMMARY		
V_{DS} (V) at T_J max.	450	
$R_{DS(on)}$ max. (W) at 25 °C	V_{GS} = 10 V	0.6
Q_g max. (nC)	30	
Q_{gs} (nC)	4	
Q_{gd} (nC)	7	
Configuration	Single	





N-Channel MOSFET

Contents

FEATURES

- Optimal design
  - Low area specific on-resistance
  - Low input capacitance (Ciss)
  - Reduced capacitive switching losses
  - High body diode ruggedness
  - Avalanche energy rated (UIS)
- Optimal efficiency and operation
  - Low cost
  - Simple gate drive circuitry
  - Low figure-of-merit (FOM): Ron x Qg
  - Fast switching
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Note
* This datasheet provides information about parts that are RoHS-compliant and / or parts that are non-RoHS-compliant. For example, parts with lead (Pb) terminations are not RoHS-compliant. Please see the information / tables in this datasheet for details.

APPLICATIONS

- Consumer electronics
  - Displays (LCD or plasma TV)
- Server and telecom power supplies
  - SMPS
- Industrial
  - Welding
  - Induction heating
  - Motor drives
- Battery chargers

ORDERING INFORMATION	
Package	TO-220AB
Lead (Pb)-free	IRF740BPbF

ABSOLUTE MAXIMUM RATINGS (T_C = 25 °C, unless otherwise noted)					
PARAMETER			**SYMBOL**	**LIMIT**	**UNIT**
Drain-Source Voltage			VDS	400	V
Gate-Source Voltage			VGS	± 30	
Gate-Source Voltage AC (f > 1 Hz)				30	
Continuous Drain Current (T_J = 150 °C)	V_{GS} at 10 V	T_C = 25 °C	I_D	10	A
		T_C = 100 °C		6	
Pulsed Drain Current a			IDM	23	
Linear Derating Factor				1.2	W/°C
Single Pulse Avalanche Energy b			EAS	194	mJ
Maximum Power Dissipation			P_D	147	W
Operating Junction and Storage Temperature Range			TJ, Tstg	-55 to +150	°C
Drain-Source Voltage Slope	T_J = 125 °C		dV/dt	24	V/ns
Reverse Diode dV/dt d				0.6	
Soldering Recommendations (Peak temperature) c	for 10 s			300	°C

Notes
a. Repetitive rating; pulse width limited by maximum junction temperature.
b. VDD = 50 V, starting TJ = 25 °C, L = 2.3 mH, Rg = 25 , IAS = 13 A.
c. 1.6 mm from case.
d. ISD ID, starting TJ = 25 °C.

THERMAL RESISTANCE RATINGS				
PARAMETER	**SYMBOL**	**TYP.**	**MAX.**	**UNIT**
Maximum Junction-to-Ambient	RthJA	–	62	°C/W
Maximum Junction-to-Case (Drai n)	RthJC	–	0.85	

SPECIFICATIONS (T_J = 25 °C, unless otherwise noted)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS**		**MIN.**	**TYP.**	**MAX.**	**UNIT**
Static							
Drain-Source Breakdown Voltag e	VDS	V_{GS} = 0 V, I_D = 250 µA		400	–	–	V
V_{DS} Temperature Coefficient	DV_{DS}/T_J	Reference to 25 °C, I_D = 250 µA		–	0.53	–	V/°C
Gate-Source Threshold Voltage (N)	VGS(th)	V_{DS} = V_{GS}, I_D = 250 µA		3	–	5	V
Gate-Source Leakage	IGSS	V_{GS} = ± 30 V		–	–	± 10 0	nA
Zero Gate Voltage Drain Current	IDSS	V_{DS} = 400 V, V_{GS} = 0 V		–	–	1	µA
		V_{DS} = 320 V, V_{GS} = 0 V, T_J = 125 °C		–	–	10	
Drain-Source On-State Resistan ce	RDS(on)	V_{GS} = 10 V	I_D = 5 A	–	0.5	0.6	W
Forward Transconductance	gfs	V_{DS} = 50 V, I_D = 5 A		–	2.7	–	S
Dynamic							
Input Capacitance	Ciss	V_{GS} = 0 V, V_{DS} = 100 V,f = 1 MH z		–	526	–	pF
Output Capacitance	Coss			–	59	–	
Reverse Transfer Capacitance	Crss			–	9	–	
Effective Output Capacitance, E nergy Related a	Co(er)	V_{GS} = 0 V, V_{DS} = 0 V to 320 V		–	66	–	
Effective Output Capacitance, Ti me Related b	Co(tr)			–	84	–	
Total Gate Charge	Q_g	V_{GS} = 10 V	I_D = 5 A, V_{DS} = 320 V	–	15	30	nC
Gate-Source Charge	Qgs			–	4	–	

Gate-Drain Charge	Qgd			–	7	–	
Turn-On Delay Time	td(on)	V_{DD} = 400 V, I_D = 10 A, V_{GS} = 10 V, R_g = 9.1 W		–	12	24	ns
Rise Time	t_r			–	18	36	
Turn-Off Delay Time	td(off)			–	18	36	
Fall Time	t_f			–	14	28	
Gate Input Resistance	R_g	f = 1 MHz, open drain		0.9	1.8	3.6	W
Drain-Source Body Diode Characteristics							
Continuous Source-Drain Diode Current	I_S	MOSFET symbolDshowing theintegral reverse p – n junction diode S	G	–	–	10	A
Pulsed Diode Forward Current	ISM			–	–	40	
Diode Forward Voltage	VSD	T_J = 25 °C, I_S = 5 A, V_{GS} = 0 V		–	–	1.2	V
Reverse Recovery Time	trr	T_J = 25 °C, I_F = I_S = 5 A,dI/dt = 100 A/µs, V = 25 VR		–	230	–	ns
Reverse Recovery Charge	Qrr			–	1.6	–	µC
Reverse Recovery Current	IRRM			–	14	–	A

Notes
a. Coss(er) is a fixed capacitance that gives the same energy as Coss while VDS is rising from 0 % to 80 % VDS.
b. Coss(tr) is a fixed capacitance that gives the same charging time as Coss while VDS is rising from 0 % to 80 % VDS.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Fig. 1 – Typical Output Characteristics

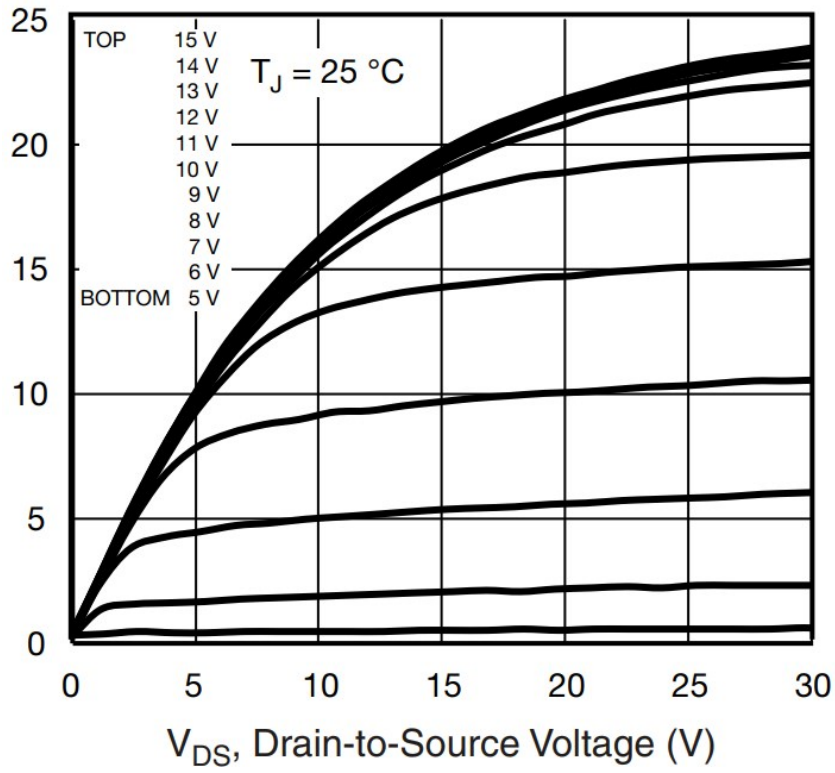


Fig. 2 – Typical Output Characteristics

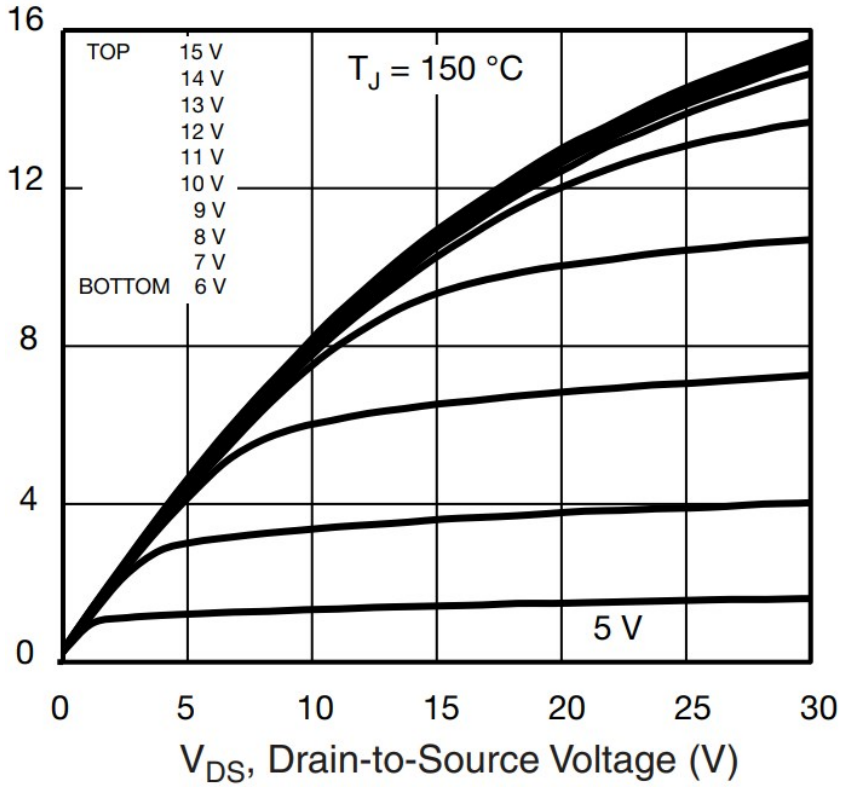


Fig. 3 – Typical Transfer Characteristics

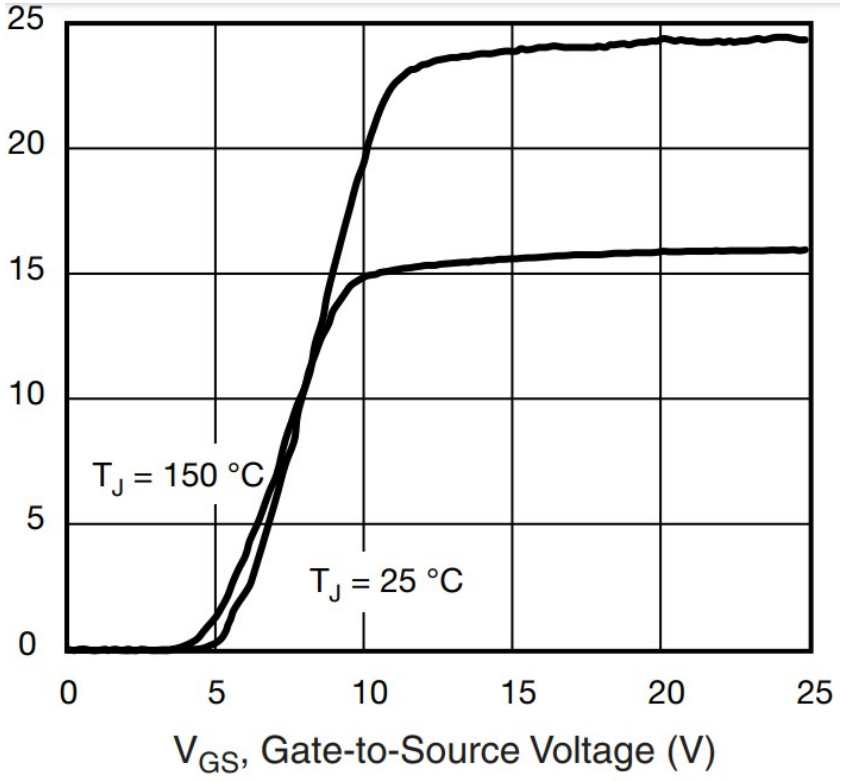


Fig. 4 – Normalized On-Resistance vs. Temperature

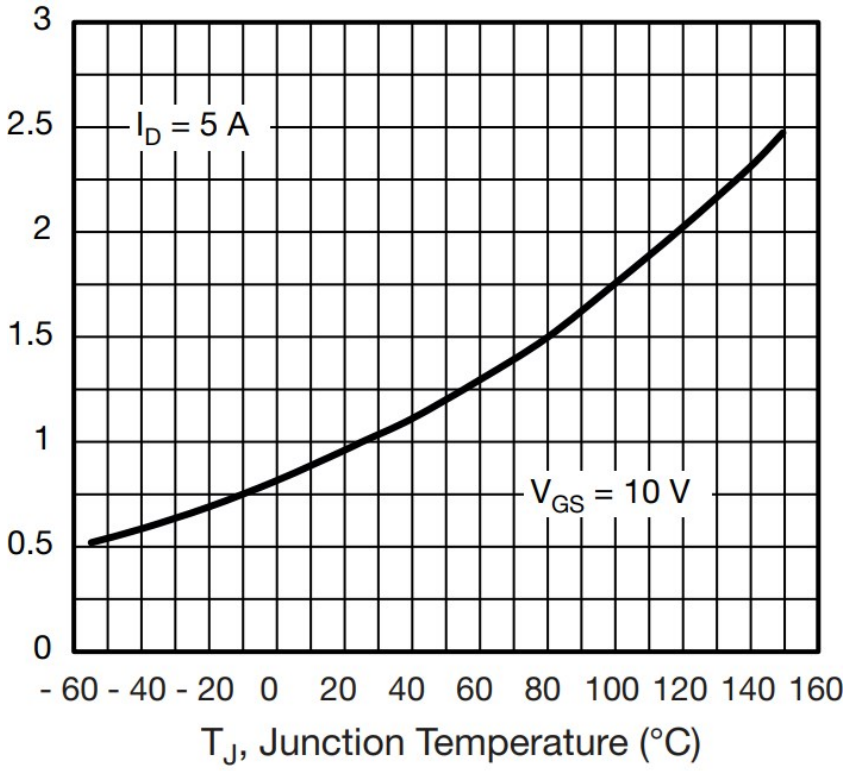


Fig. 5 – Typical Capacitance vs. Drain-to-Source Voltage

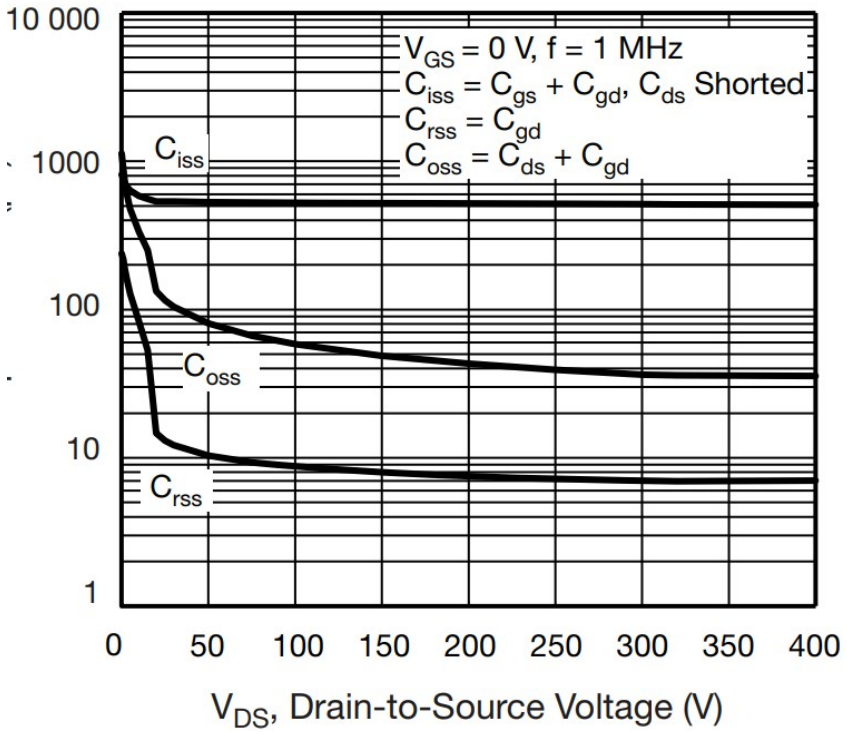


Fig. 6 – Typical Gate Charge vs. Gate-to-Source Voltage

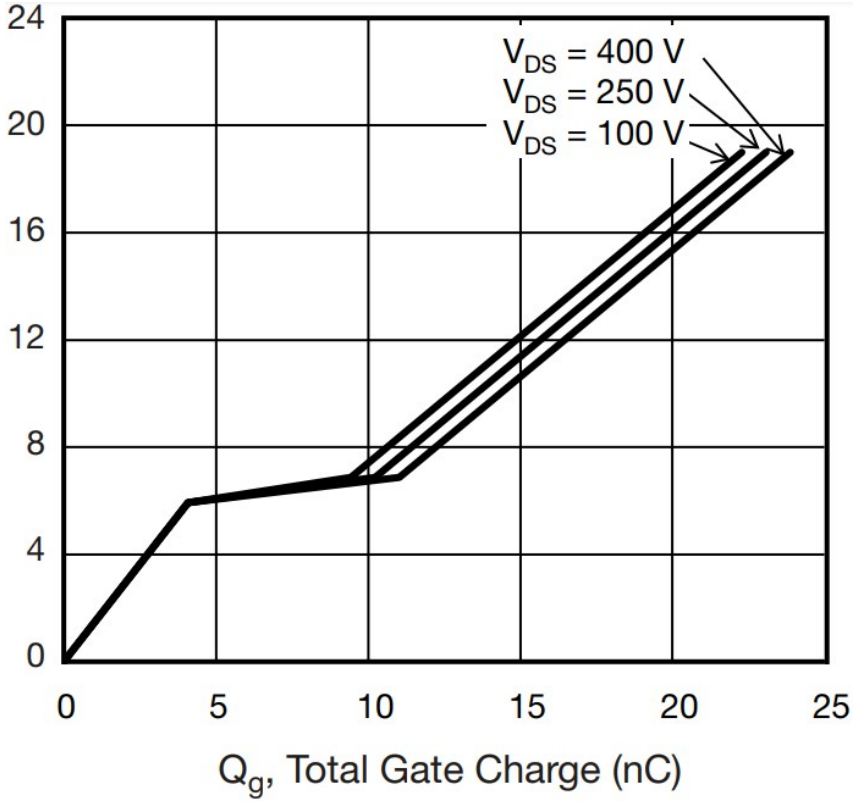


Fig. 7 – Typical Source-Drain Diode Forward Voltage

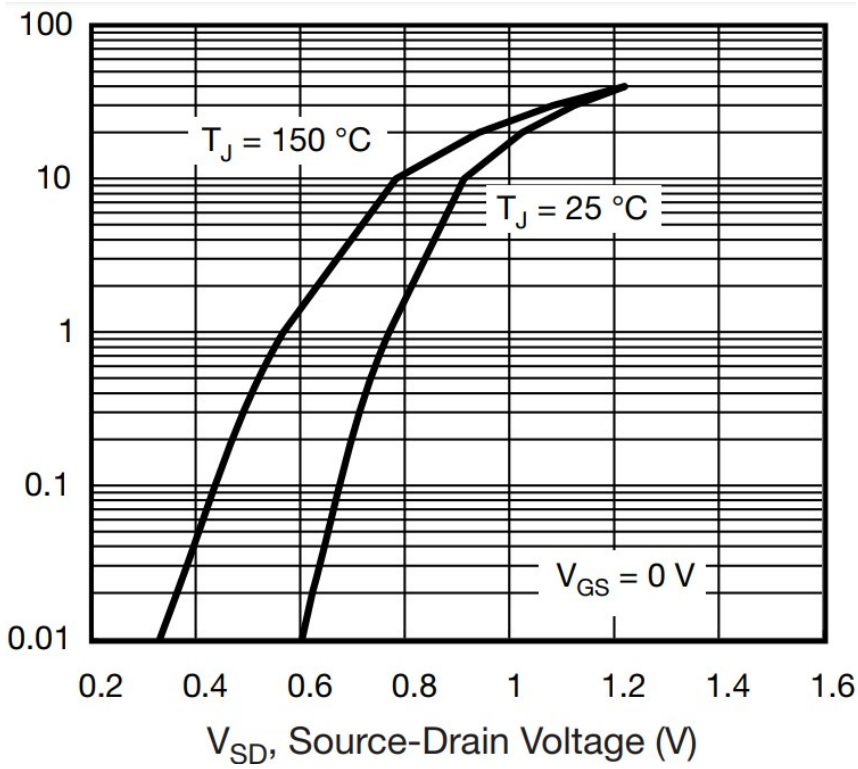


Fig. 8 – Maximum Safe Operating Area

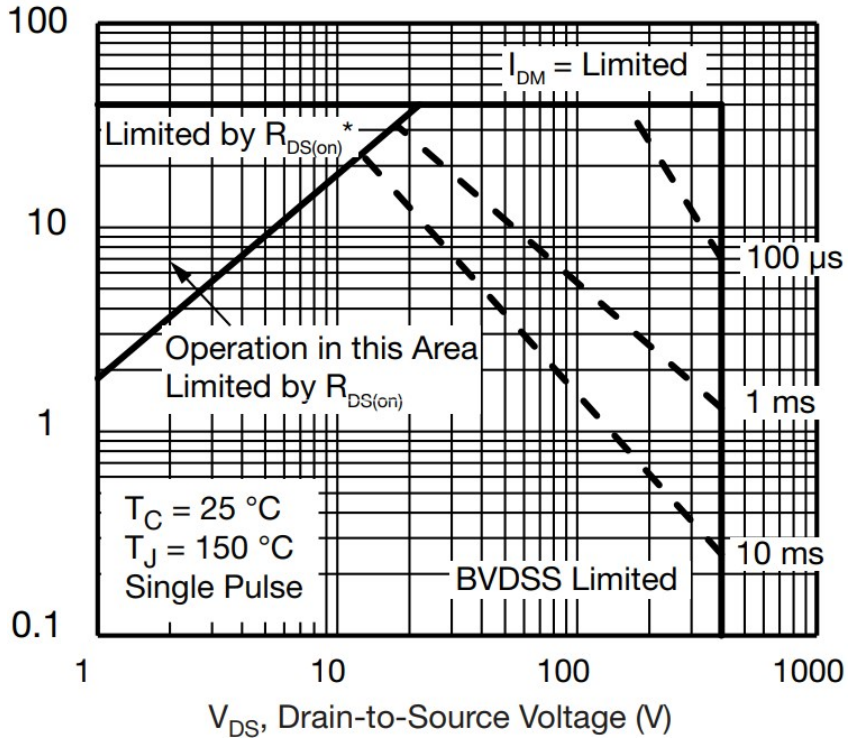


Fig. 9 – Maximum Drain Current vs. Case Temperature

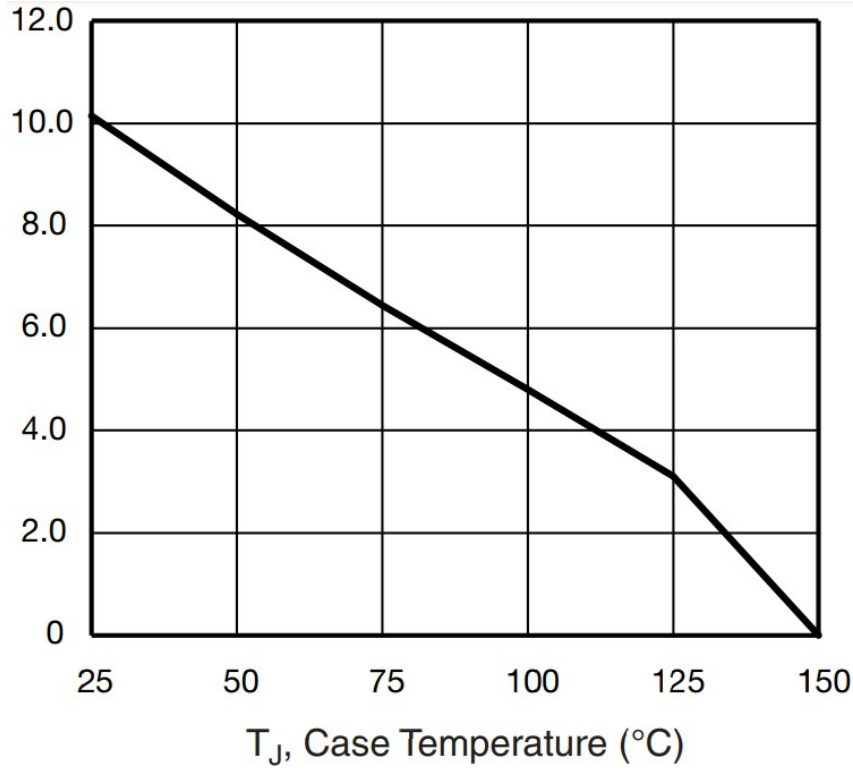


Fig. 10 – Temperature vs. Drain-to-Source Voltage

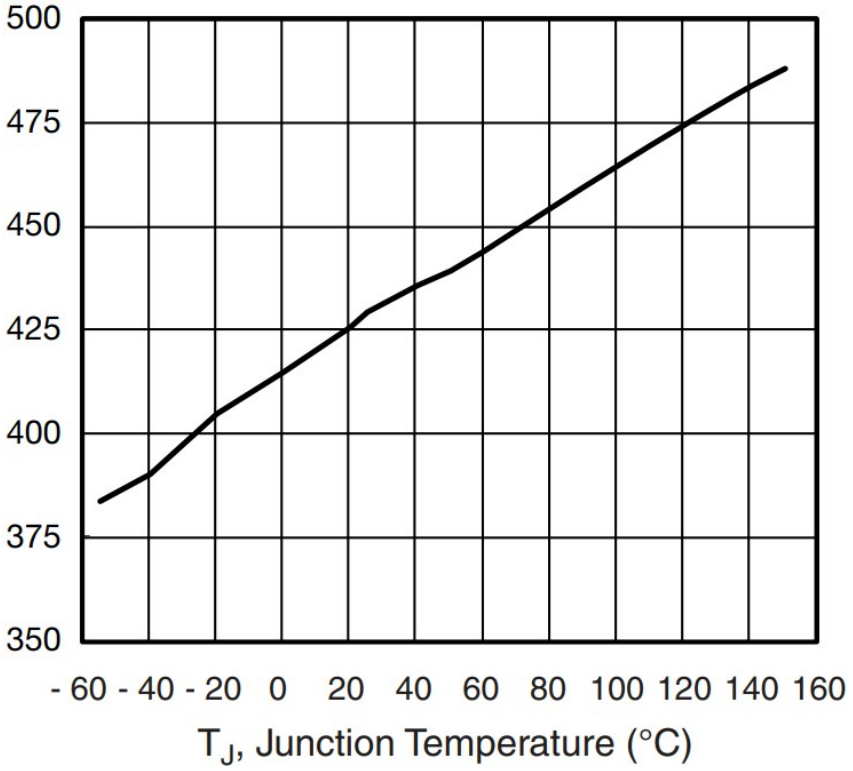


Fig. 11 – Normalized Thermal Transient Impedance, Junction-to-Case

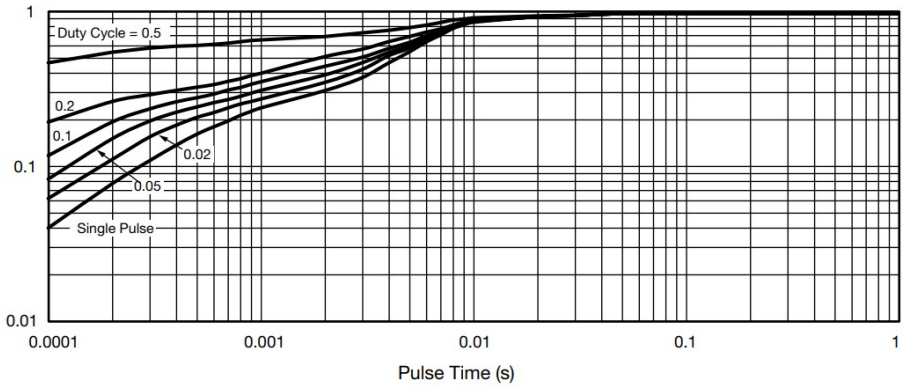


Fig. 12 – Switching Time Test Circuit

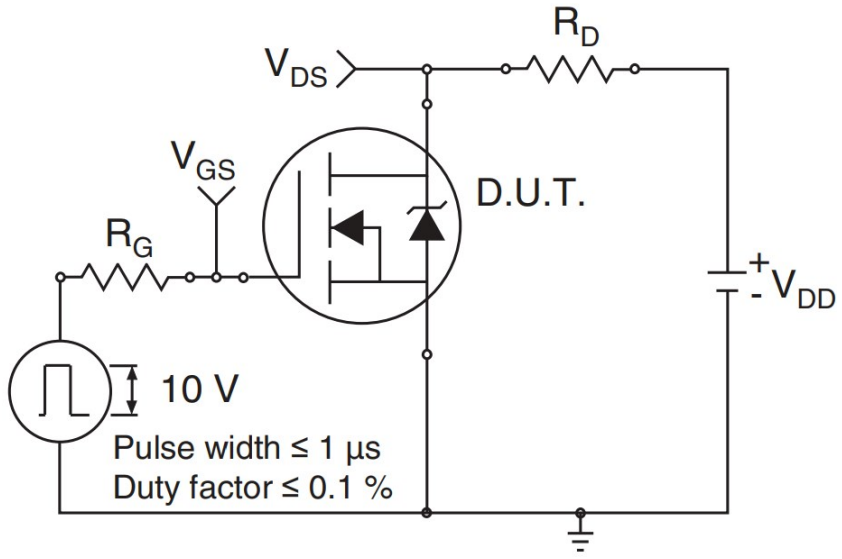


Fig. 13 – Switching Time Waveforms

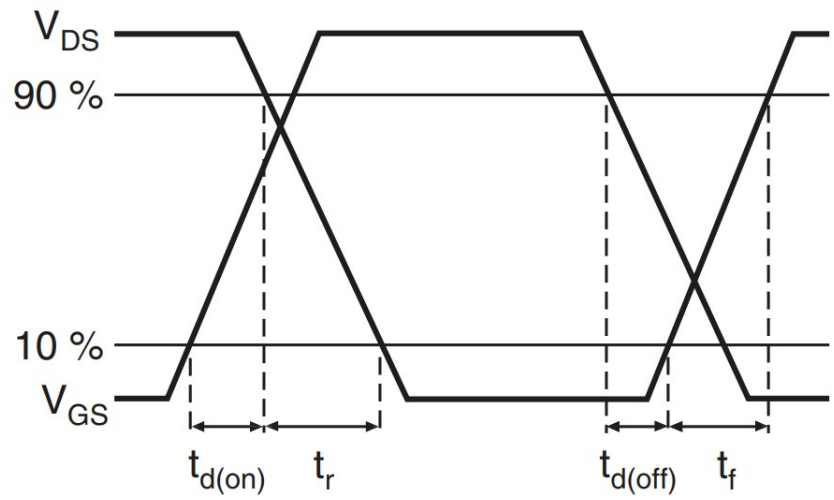


Fig. 14 – Unclamped Inductive Test Circuit

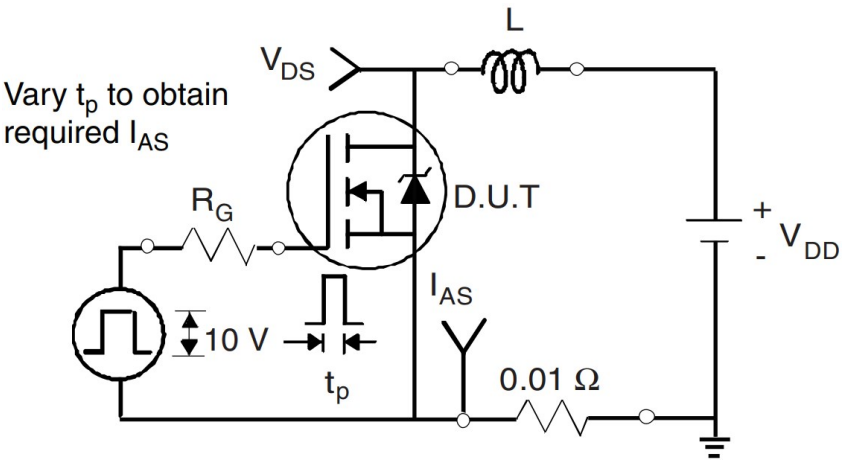


Fig. 15 – Unclamped Inductive Waveforms

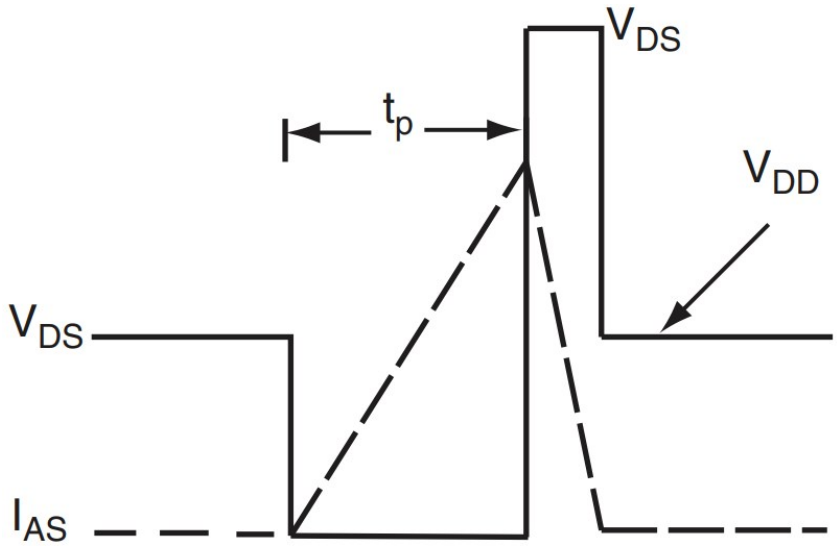


Fig. 16 – Basic Gate Charge Waveform

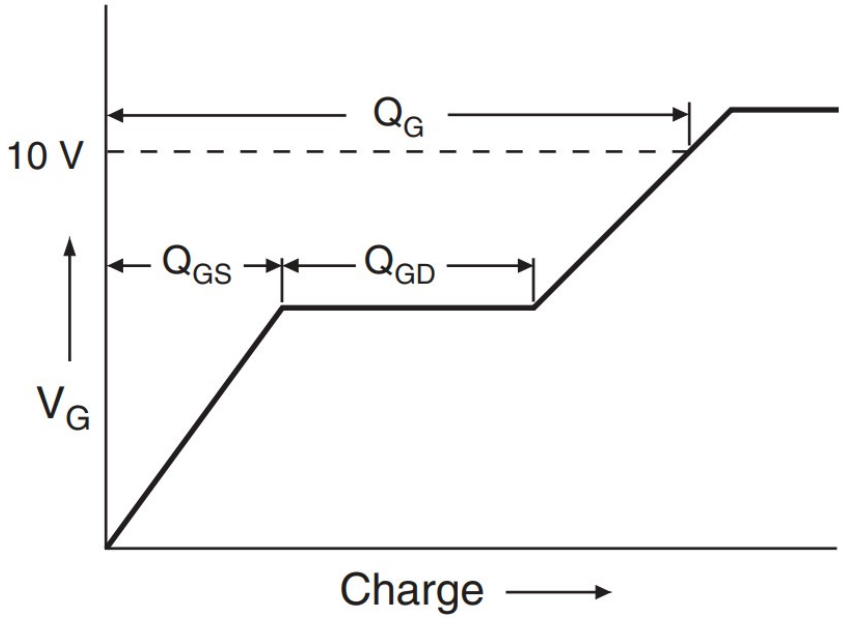


Fig. 17 – Gate Charge Test Circuit

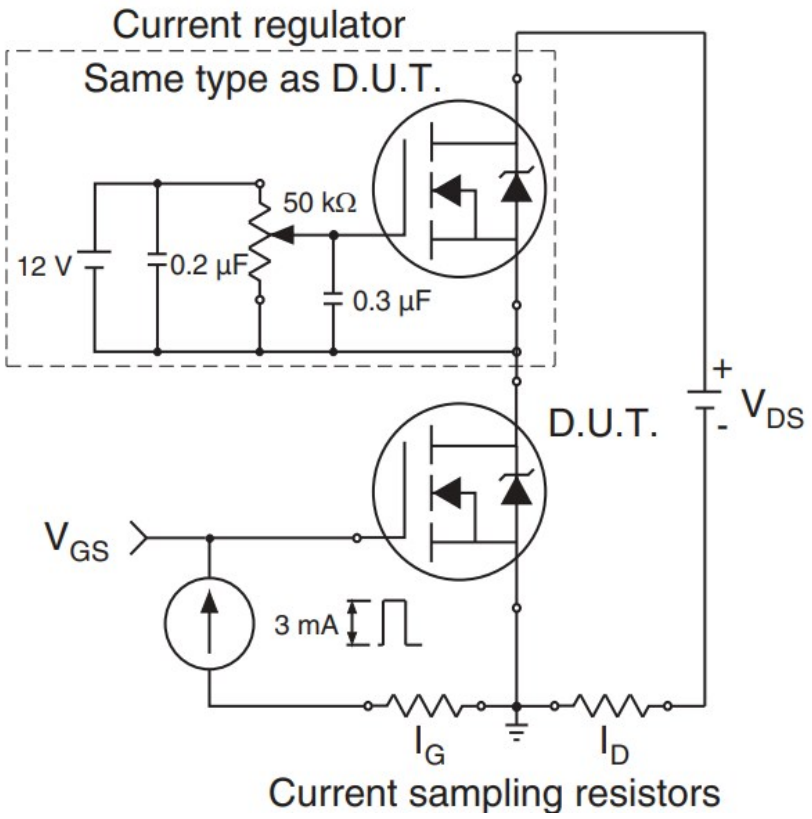
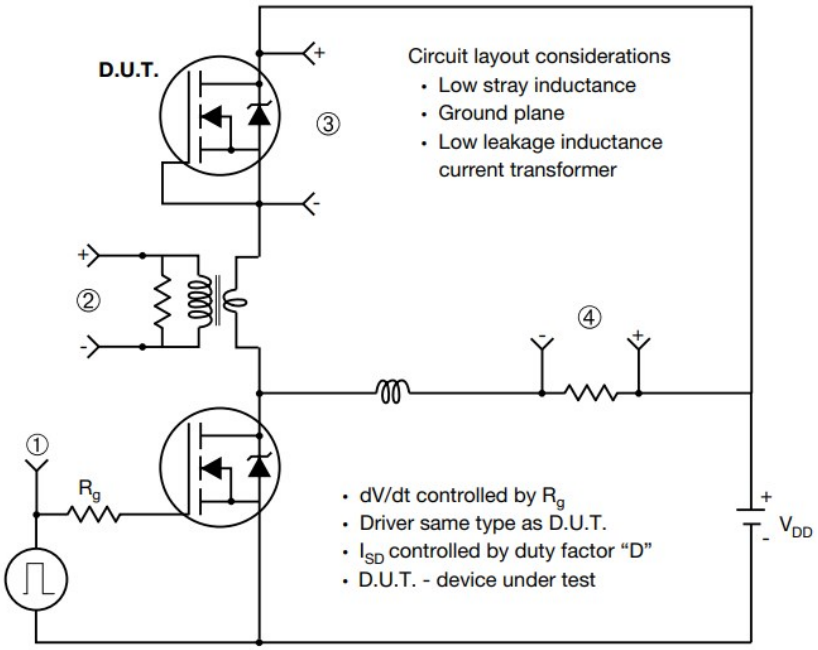
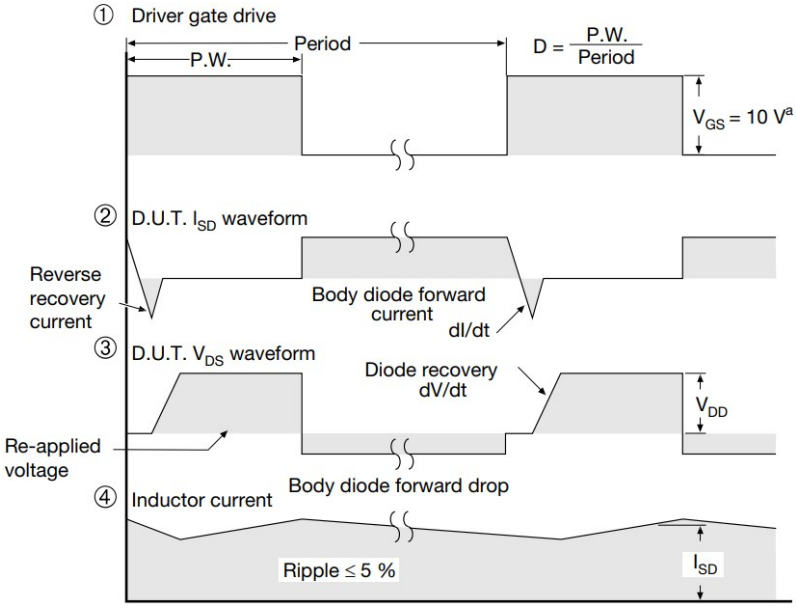
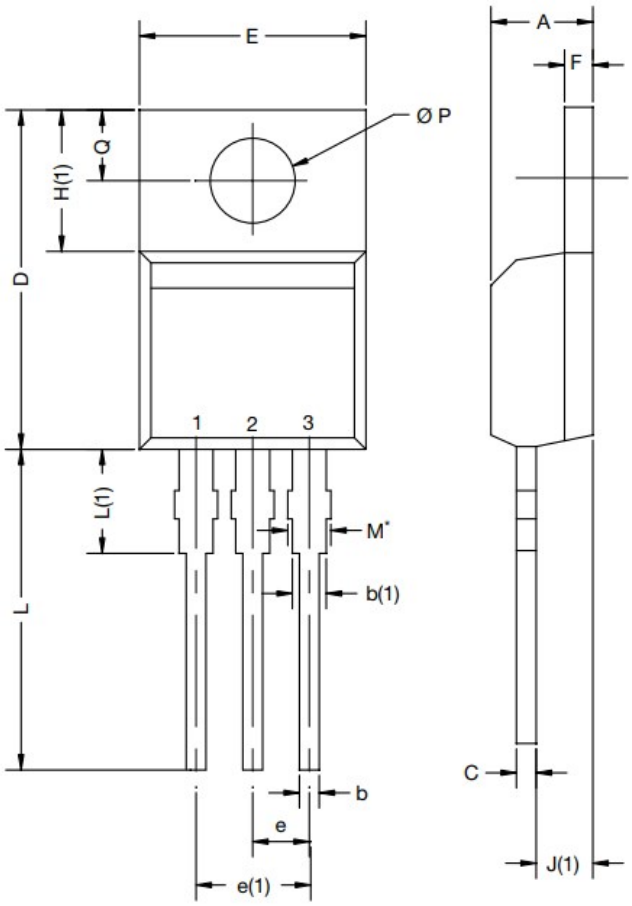


Fig. 18 – For N-Channel

Peak Diode Recovery dV/dt Test Circuit





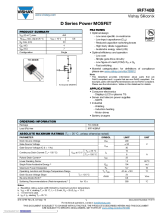

E
A
F
Ø P
Q
H(1)
D
1
2
3
L(1)
M*
b(1)
L
C
b
e
e(1)
J(1)

DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.24	4.65	0.167	0.183
b	0.69	1.02	0.027	0.040
b(1)	1.14	1.78	0.045	0.070
c	0.36	0.61	0.014	0.024
D	14.33	15.85	0.564	0.624
E	9.96	10.52	0.392	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)	6.10	6.71	0.240	0.264
J(1)	2.41	2.92	0.095	0.115
L	13.36	14.40	0.526	0.567
L(1)	3.33	4.04	0.131	0.159
Ø P	3.53	3.94	0.139	0.155
Q	2.54	3.00	0.100	0.118
ECN: E21-0621-Rev. D, 04-Nov-2021 DWG: 6031				

Disclaimer

sustaining applications or for any other application in which the failure of the Vishay prod uct could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

Documents / Resources

	**VISHAY IRF740B D Series Power MOSFET** [pdf] Owner's Manual IRF740B D Series Power MOSFET, IRF740B, D Series Power MOSFET, Power MOSFET, MOSFET

References

- applications.no
- vishay.com/doc?91000
- IRF740B D Series Power MOSFET | Vishay