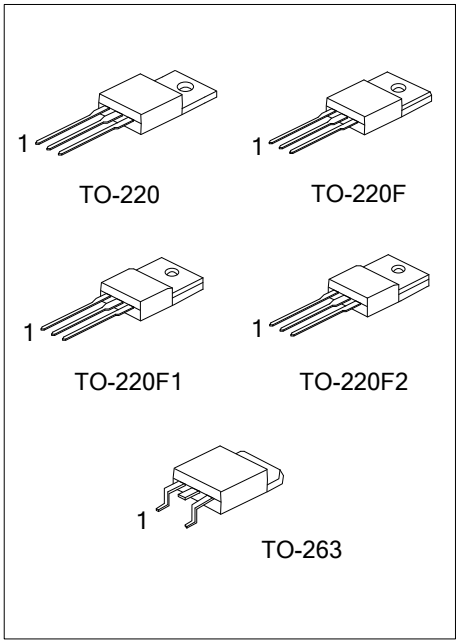
UF740

Power MOSFET

10A, 400V, 0.55Ω N-CHANNEL POWER MOSFET



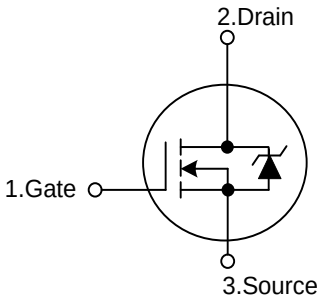
■ DESCRIPTION

The N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

■ FEATURES

* 10A, 400V, $R_{DS(ON)}$(0.55Ω)
* Single Pulse Avalanche Energy Rated
* Rugged - SOA is Power Dissipation Limited
* Fast Switching Speeds
* Linear Transfer Characteristics
* High Input Impedance

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF740L-TA3-T	UF740G-TA3-T	TO-220	G	D	S	Tube
UF740L-TF1-T	UF740G-TF1-T	TO-220F1	G	D	S	Tube
UF740L-TF2-T	UF740G-TF2-T	TO-220F2	G	D	S	Tube
UF740L-TF3-T	UF740G-TF3-T	TO-220F	G	D	S	Tube
UF740L-TQ2-T	UF740G-TQ2-T	TO-263	G	D	S	Tube
UF740L-TQ2-R	UF740G-TQ2-R	TO-263	G	D	S	Tape Reel

Note: Pin Assignment: G: Gate D: Drain S: Source

UF740L-TA3-T
(1)Packing Type
(2)Package Type
(3)Lead Free

(1) R: Tape Reel, T: Tube
(2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TQ2: TO-263
(3) L: Lead Free, G: Halogen Free

■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, Unless Otherwise Specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage (T_J =25°C~125°C)		V_{DS}	400	V
Drain to Gate Voltage (R_{GS} = 20kΩ) (T_J =25°C~125°C)		V_{DGR}	400	V
Gate to Source Voltage		V_{GS}	±20	V
Drain Current	Continuous	I_D	10	A
	T_C = 100°C	I_D	6.3	A
	Pulsed	I_{DM}	40	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	520	mJ
Power Dissipation	TO-220/TO-263	P_D	125	W
	TO-220F/TO-220F1		44	
	TO-220F2		46	
Derating above 25°C	TO-220/TO-263		1.0	W/°C
	TO-220F/TO-220F1		0.35	
	TO-220F2		0.37	
Junction Temperature		T_J	+150	°C
Operating Temperature		T_{OPR}	-55 ~ +150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

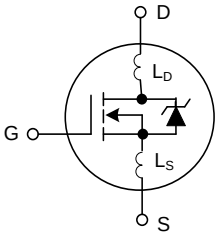
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

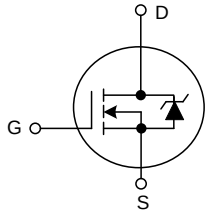
■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	62.5	°C/W
Junction to Case	TO-220/TO-263	θ_{Jc}	1.0	°C/W
	TO-220F/TO-220F1		2.86	
	TO-220F2		2.72	

■ ELECTRICAL CHARACTERISTICS (T_C =25°C, Unless Otherwise Specified.)

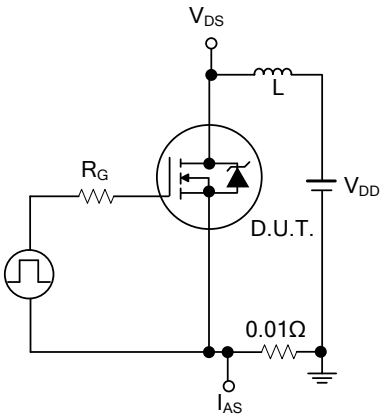
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Drain to Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = 250μA	400			V
Gate to Threshold Voltage	$V_{GS(THR)}$	V_{GS} = V_{DS}, I_D = 250μA	2.0		4.0	V
On-State Drain Current (Note 1)	$I_{D(ON)}$	V_{DS} >$I_{D(ON)}$ x $R_{DS(ON)MAX}$, V_{GS} =10V	10			A
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = Rated BV_{DSS}, V_{GS} = 0V			25	μA
		V_{DS}=0.8 x Rated BV_{DSS}, V_{GS}=0V,T_J=125°C			250	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±20V			±500	nA
Drain to Source On Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 5.2A (Note 1)		0.38	0.55	Ω
Forward Transconductance	g_{FS}	V_{DS} ≥ 50V, I_D = 5.2A (Note 1)	5.8	8.9		S
Turn-On Delay Time	$t_{DLY(ON)}$	V_{DD} = 200V, I_D ≈ 10A, R_{GS} = 9.1Ω, R_L = 20Ω, V_{GS} = 10V MOSFET Switching Times are Essentially Independent of Operating Temperature		65	75	ns
Rise Time	t_R			130	145	ns
Turn-Off Delay Time	$t_{DLY(OFF)}$			240	260	ns
Fall Time	t_F			145	155	ns
Total Gate Charge (Gate to Source + Gate to Drain)	$Q_{G(TOT)}$	V_{GS} = 10V, I_D = 10A, $I_{G(REF)}$ = 1.5mA, V_{DS} = 0.8 x Rated BV_{DSS}		138		nC
Gate to Source Charge	Q_{GS}	Gate Charge is Essentially Independent of Operating Temperature		35		nC
Gate to Drain “Miller” Charge	Q_{GD}			35		nC
Input Capacitance	C_{ISS}	V_{GS} = 0V, V_{DS} =25V, f = 1.0MHz		1170		pF
Output Capacitance	C_{OSS}			160		pF
Reverse - Transfer Capacitance	C_{RSS}			26		pF
Internal Drain Inductance	L_D	Measured From the Contact Screw on Tab to Center of Die; Modified MOSFET Symbol Showing the Internal Devices Inductances		3.5		nH
		Measured From the Drain Lead, 6mm (0.25in) From Package to Center of Die		4.5		nH
Internal Source Inductance	L_S	Measured From the Source Lead, 6mm (0.25in) From Header to Source Bonding Pad		7.5		nH
SOURCE TO DRAIN DIODE SPECIFICATIONS						
Source to Drain Diode Voltage	V_{SD}	T_J = 25°C, I_{SD} = 10A, V_{GS} = 0V (Note 1)			2.0	V
Continuous Source to Drain Current	I_S	Modified MOSFET Symbol Showing the Integral Reverse P-N Junction Diode			10	A
Pulse Source to Drain Current (Note 2)	I_{SM}				40	A
Reverse Recovery Time	t_{rr}	T_J = 25°C, I_{SD} = 10A, dI_{SD}/dt = 100A/μs	170	390	790	ns
Reverse Recovery Charge	Q_{RR}	T_J = 25°C, I_{SD} = 10A, dI_{SD}/dt = 100A/μs	1.6	4.5	8.2	μC



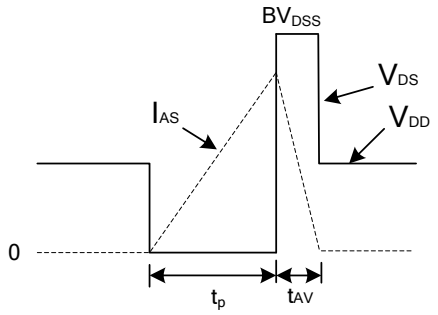


Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty Cycle≤2%.
2. Repetitive rating: Pulse width limited by maximum junction temperature.
3. V_{DD}=50V, starting T_J =25°C, L=9.1mH, R_G=25Ω, peak I_{AS} = 10A

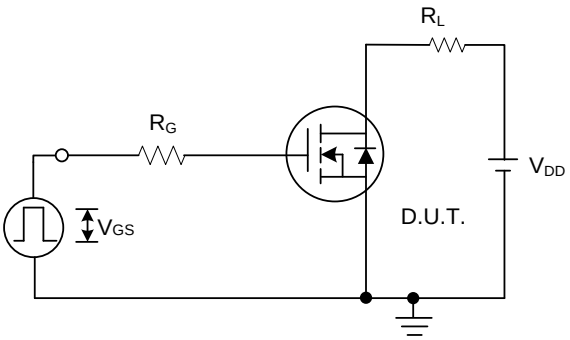
■ TEST CIRCUITS AND WAVEFORMS



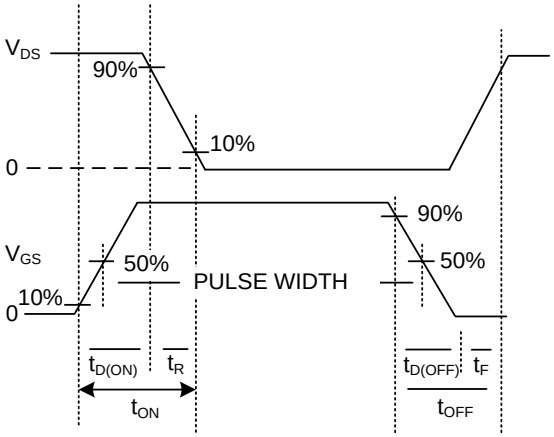
Unclamped Energy Test Circuit



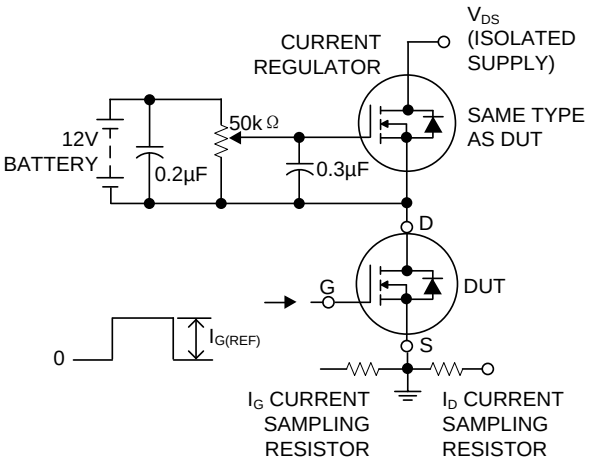
Unclamped Energy Waveforms



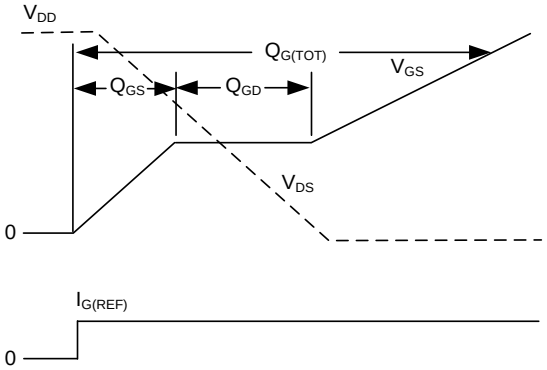
Switching Time Test Circuit



Resistive Switching Waveforms



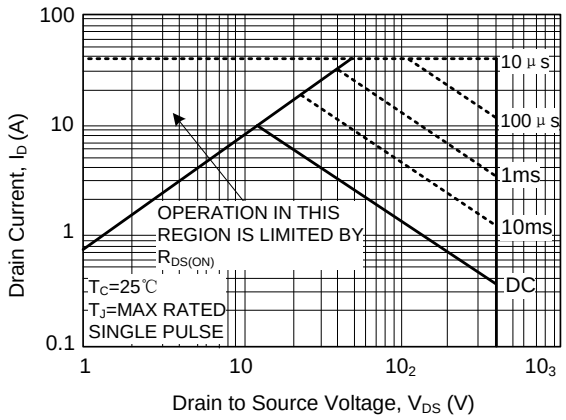
Gate Charge Test Circuit



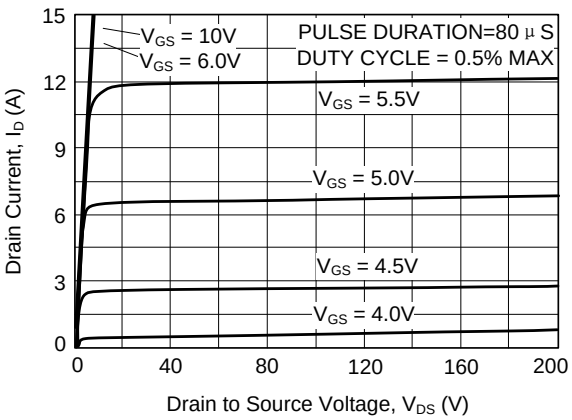
Gate Charge Waveforms

■ TYPICAL PERFORMANCE CUVES

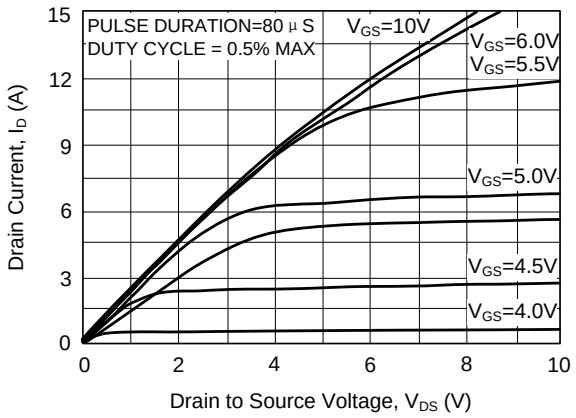
Forward Bias Safe Operating Area



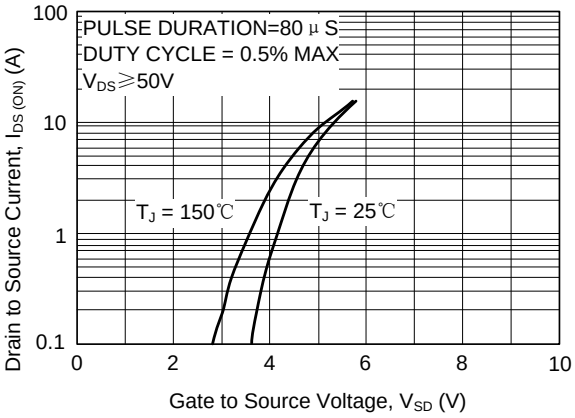
Output Characteristics



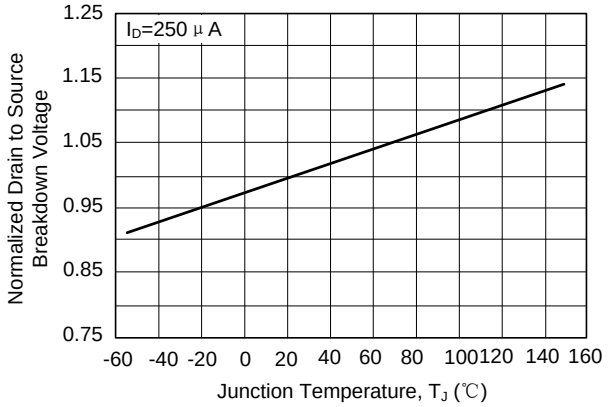
Saturation Characteristics



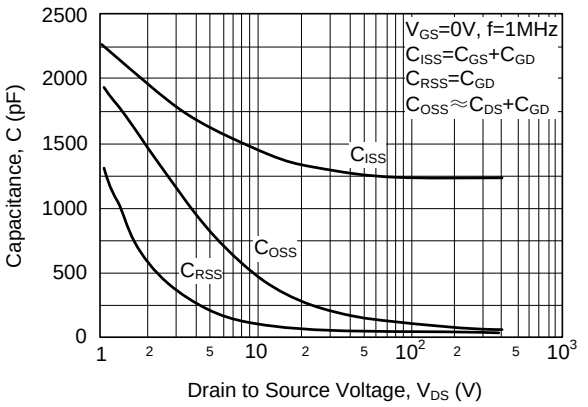
Transfer Characteristics



Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

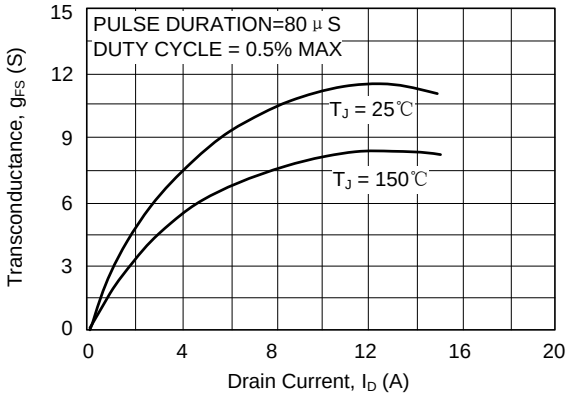


Capacitance vs. Drain to Source Voltage

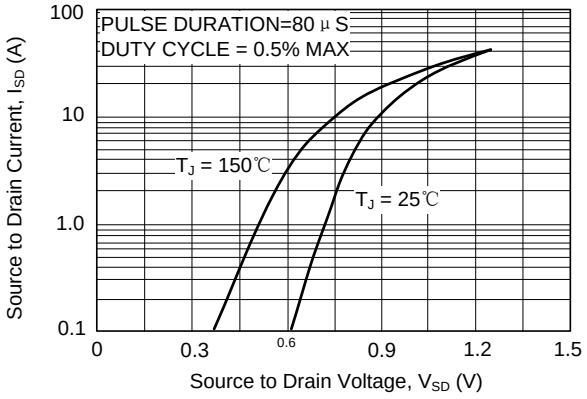


■ TYPICAL PERFORMANCE CUVES (Cont.)

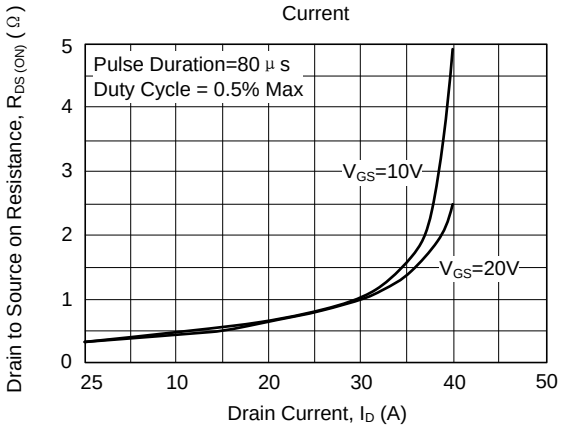
Transconduce vs. Drain Current



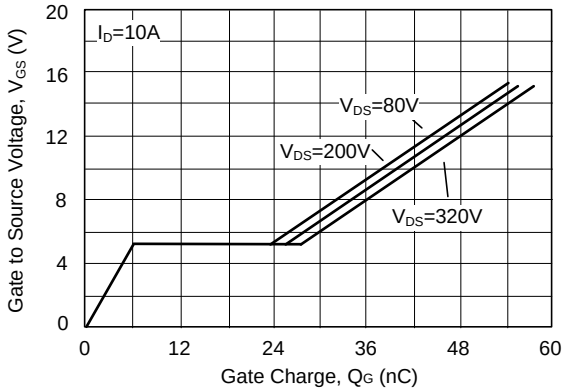
Source to Drain Diode Voltage



Drain to Source on Resistance vs. Voltage and Drain Current



Gate to Source Voltage vs. Gate Charge



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