



UF740-E

Power MOSFET

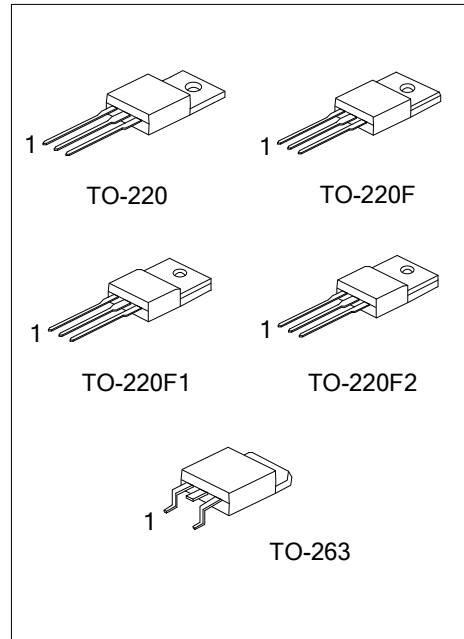
10A, 400V, 0.55Ω N-CHANNEL POWER MOSFET

DESCRIPTION

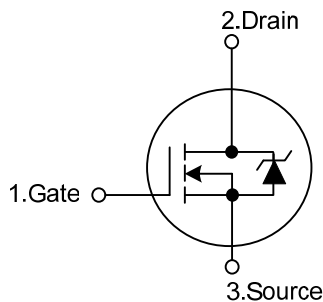
The N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

FEATURES

- * 10A, 400V, $R_{DS(ON)}(0.55\Omega)$
- * 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

<p>UF740L-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Lead Free</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TQ2: TO-263 (3) L: Lead Free, G: Halogen Free</p>
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■ **ABSOLUTE MAXIMUM RATINGS** ($T_C = 25^\circ\text{C}$, Unless Otherwise Specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain to Source Voltage ($T_J = 25^\circ\text{C} \sim 125^\circ\text{C}$)		V_{DS}	400	V
Drain to Gate Voltage ($R_{GS} = 20\text{k}\Omega$) ($T_J = 25^\circ\text{C} \sim 125^\circ\text{C}$)		V_{DGR}	400	V
Gate to Source Voltage		V_{GS}	± 20	V
Drain Current	Continuous	I_D	10	A
	$T_C = 100^\circ\text{C}$	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/ $^\circ\text{C}$
	TO-220F/TO-220F1		0.35	
	TO-220F2		0.37	
Junction Temperature		T_J	+150	$^\circ\text{C}$
Operating Temperature		T_{OPR}	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

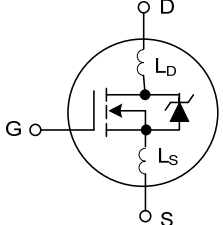
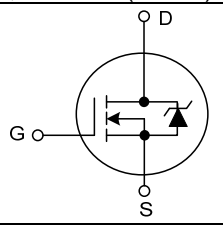
Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged.

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	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220/TO-263	θ_{Jc}	1.0	$^\circ\text{C}/\text{W}$
	TO-220F/TO-220F1		2.86	
	TO-220F2		2.72	

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

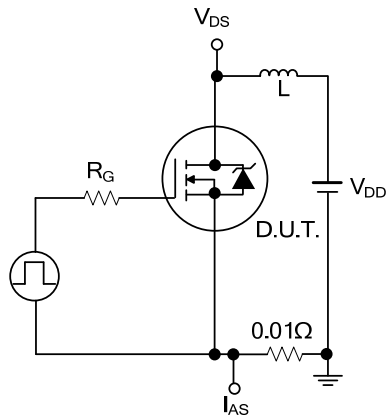
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Drain to Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	400			V
Gate to Threshold Voltage	V _{GS(THR)}	V _{GS} = V _{DS} , I _D = 250μA	2.0		4.0	V
On-State Drain Current (Note 1)	I _{D(ON)}	V _{DS} > I _{D(ON)} × R _{DS(ON)MAX} , V _{GS} = 10V	10			A
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = Rated BV _{DSS} , V _{GS} = 0V			25	μA
		V _{DS} = 0.8 × 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)		0.47	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,		45	55	ns
Rise Time	t _R	R _{GS} = 9.1Ω, R _L = 20Ω, V _{GS} = 10V		65	75	ns
Turn-Off Delay Time	t _{DLY(OFF)}	MOSFET Switching Times are Essentially Independent of Operating Temperature		150	180	ns
Fall Time	t _F			70	85	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 × Rated BV _{DSS}		100	120	nC
Gate to Source Charge	Q _{GS}	Gate Charge is Essentially Independent of Operating Temperature		10		nC
Gate to Drain "Miller" Charge	Q _{GD}			20		nC
Input Capacitance	C _{ISS}			1225		pF
Output Capacitance	C _{OSS}	V _{GS} = 0V, V _{DS} = 25V, f = 1.0MHz		300		pF
Reverse - Transfer Capacitance	C _{RSS}			80		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%.

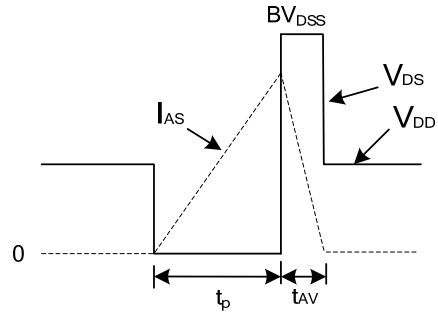
2. Repetitive rating: Pulse width limited by maximum junction temperature.

3. V_{DD} = 50V, starting T_J = 25°C, L = 9.1mH, R_G = 25Ω, peak I_{AS} = 10A

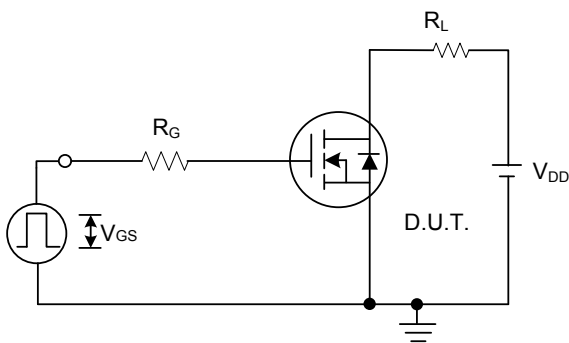
TEST CIRCUITS AND WAVEFORMS



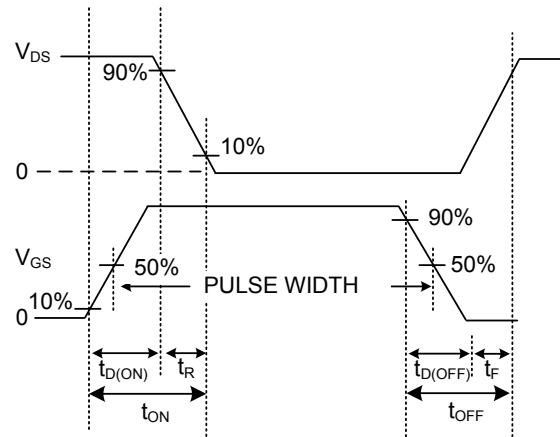
Unclamped Energy Test Circuit



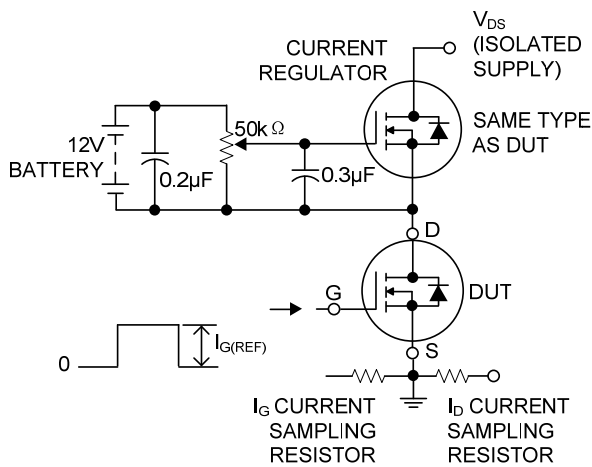
Unclamped Energy Waveforms



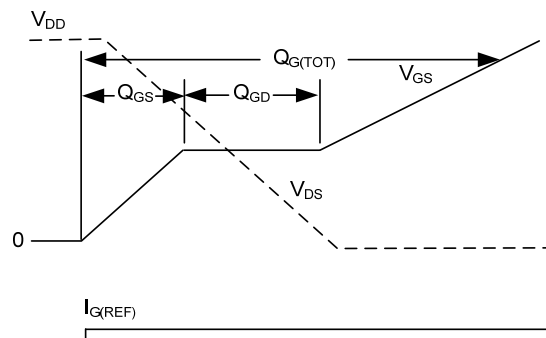
Switching Time Test Circuit



Resistive Switching Waveforms



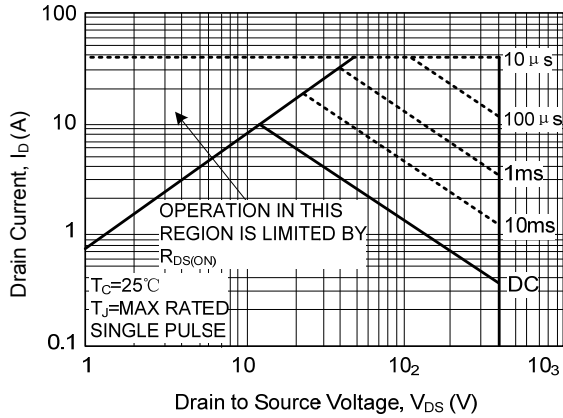
Gate Charge Test Circuit



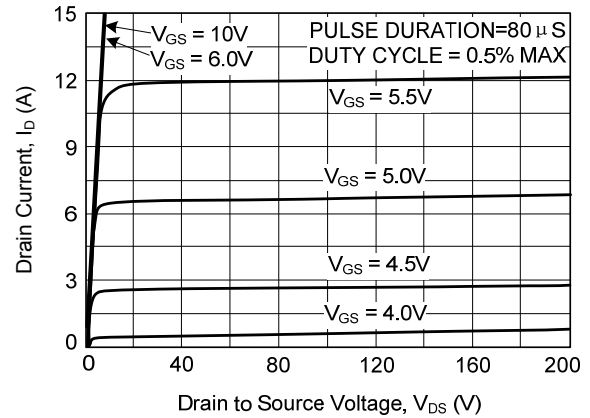
Gate Charge Waveforms

TYPICAL PERFORMANCE CURVES

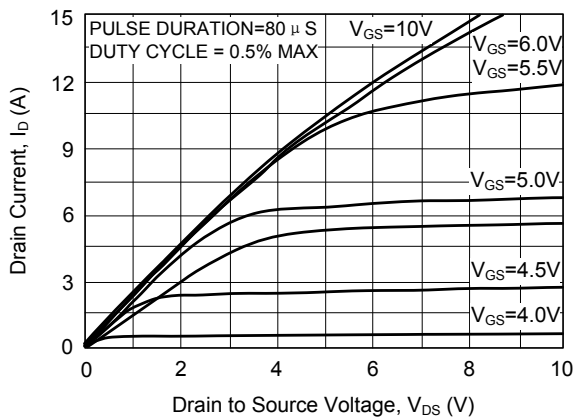
Forward Bias Safe Operating Area



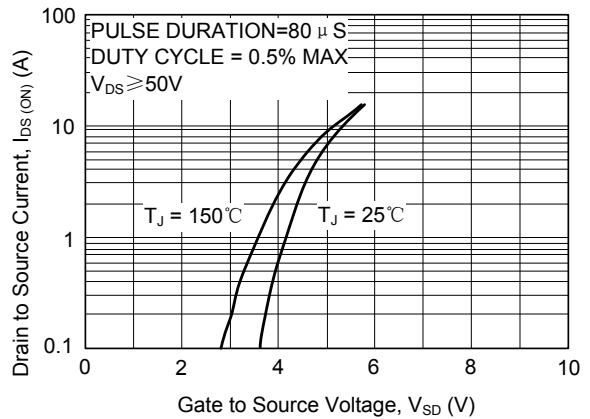
Output Characteristics



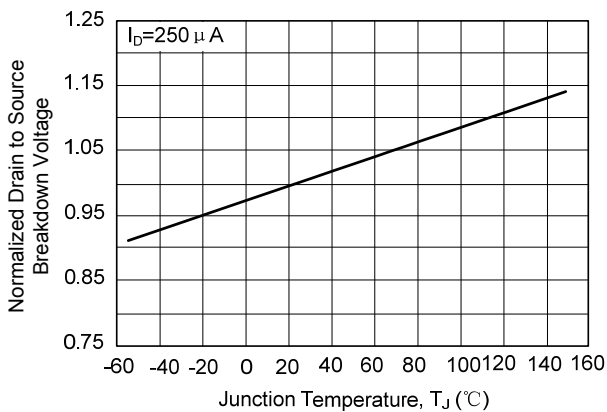
Saturation Characteristics



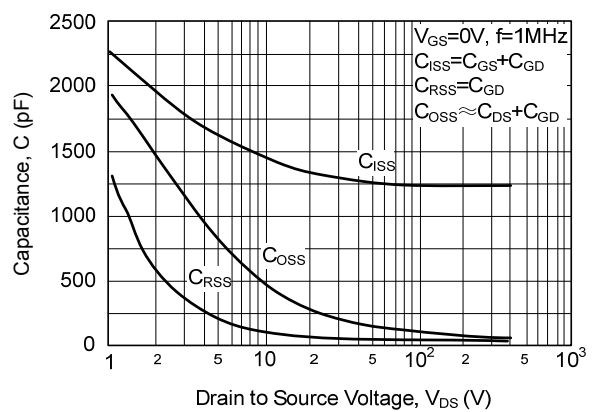
Transfer Characteristics



Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

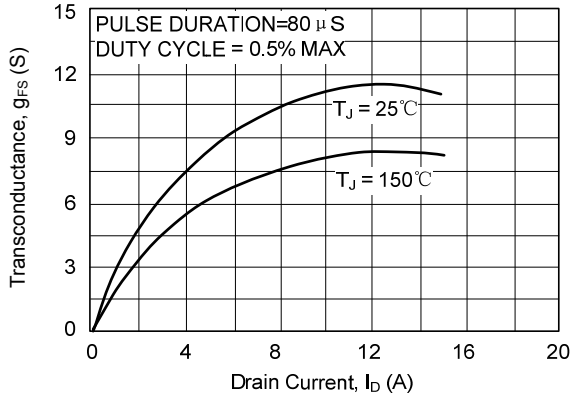


Capacitance vs. Drain to Source Voltage

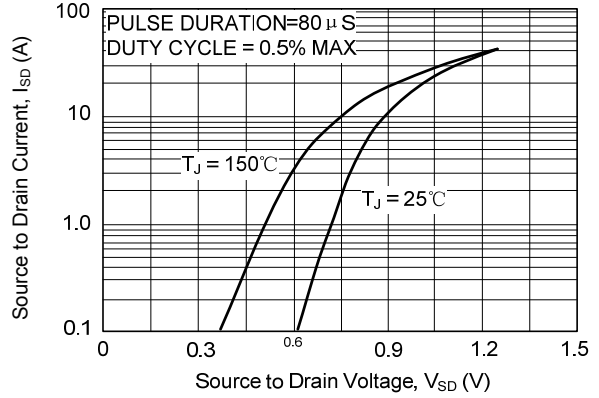


■ TYPICAL PERFORMANCE CUVES (Cont.)

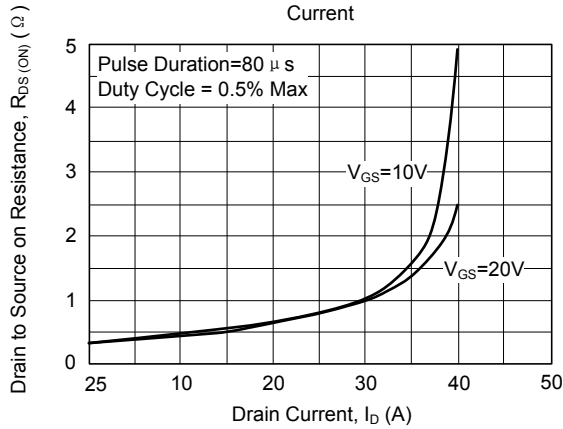
Transconduce vs. Drain Current



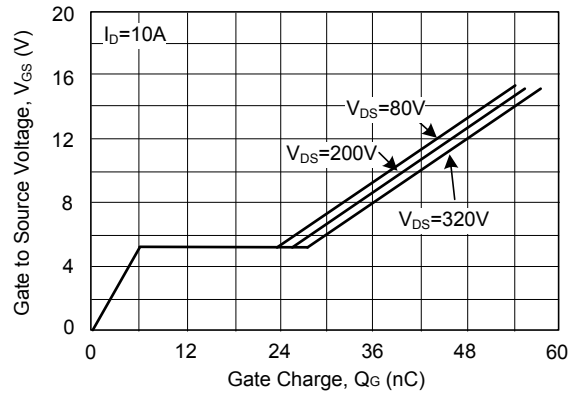
Source to Drain Diode Voltage



Drain to Source on Resistance vs. Voltage and Drain Current



Gate to Source Voltage vs. Gate Charge



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