UTC UNISONIC TECHNOLOGIES CO., LTD

UF740-E **Power MOSFET**

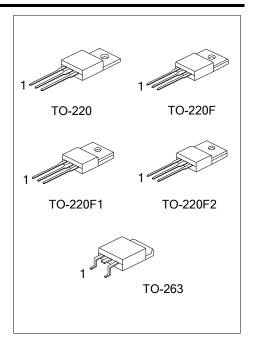
10A, 400V, 0.55Ω N-CHANNEL **POWER MOSFET**

DESCRIPTION

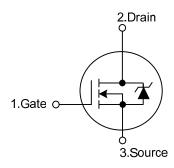
The N-Channel enhancement mode silicon gate power MOSFET is designed for high voltage, high speed power switching applications such as switching regulators, switching converters, solenoid, motor drivers, relay drivers.

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



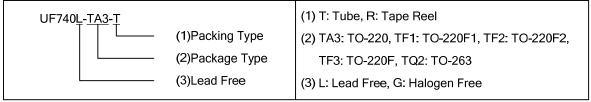
SYMBOL



ORDERING INFORMATION

Ordering Number		Deelsene	Pin Assignment			Dookina	
Lead Free	Halogen Free	Package	1	2	3	Packing	
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 S: Source D: Drain



UF740-E

■ **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	Α	
	$T_{C} = 100^{\circ}C$	I _D	6.3	Α	
	Pulsed	I_{DM}	I _{DM} 40		
Avalanche Energy	Single Pulsed (Note 3)	E _{AS}	520	mJ	
Power Dissipation	TO-220/TO-263		125		
	TO-220F/TO-220F1		44	W	
	TO-220F2		46		
Derating above 25°C	TO-220/TO-263	P_D	1.0	W/°C	
	TO-220F/TO-220F1		0.35		
	TO-220F2		0.37		
Junction Temperature		TJ	+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		1.0		
	TO-220F/TO-220F1	θ_{Jc}	2.86	°C/W	
	TO-220F2		2.72		

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

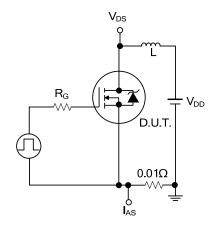
	SYMBOL	TEST CONDITIONS	MIN	TVD	B 4 A \	
Drain to Course Prockdown Voltage		TEST CONDITIONS		TYP	MAX	UNIT
Drain to Source Breakdown Voltage	BV _{DSS}	$V_{GS} = 0V, I_D = 250\mu A$				V
Gate to Threshold Voltage	$V_{GS(THR)}$	$V_{GS} = V_{DS}, I_D = 250 \mu A$			4.0	V
On-State Drain Current (Note 1)	$I_{D(ON)}$	$V_{DS} > I_{D(ON)} \times R_{DS(ON)MAX}, V_{GS} = 10V$				Α
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = Rated BV _{DSS} , V _{GS} = 0V			25	μΑ
2010 Gate Voltage Brain Guirent	פטי	V _{DS} =0.8 x Rated BV _{DSS} , V _{GS} =0V,T _J =125°C			250	μΑ
Gate to Source Leakage Current	I_{GSS}	V _{GS} = ±20V			±500	nA
Drain to Source On Resistance	R _{DS(ON)}	$V_{GS} = 10V, I_D = 5.2A \text{ (Note 1)}$		0.47	0.55	Ω
Forward Transconductance	g FS	V _{DS} ≥ 50V, I _D = 5.2A (Note 1)		8.9		S
Turn-On Delay Time	$t_{\text{DLY}(\text{ON})}$	$V_{DD} = 200V, I_{D} \approx 10A,$		45	55	ns
Rise Time	t_R	$R_{GS} = 9.1\Omega$, $R_{L} = 20\Omega$, $V_{GS} = 10V$		65	75	ns
Turn-Off Delay Time	$t_{DLY(OFF)}$	MOSFET Switching Times are Essentiall	/	150	180	ns
Fall Time	t_{\scriptscriptstyleF}	Independent of Operating Temperature		70	85	ns
Total Gate Charge		$V_{GS} = 10V$, $I_D = 10A$, $I_{G(REF)} = 1.5mA$,		100	120	nC
(Gate to Source + Gate to Drain)	$Q_{G(TOT)}$	V _{DS} = 0.8 x Rated BV _{DSS}		100	120	110
Gate to Source Charge	Q_GS	Gate Charge is Essentially Independent of		10		nC
Gate to Drain "Miller" Charge	Q_GD	Operating Temperature		20		nC
Input Capacitance	C_{ISS}			1225		pF
Output Capacitance	out Capacitance C_{OSS} $V_{GS} = 0V, V_{DS} = 25V, f = 1.0MHz$			300		pF
Reverse - Transfer Capacitance	C_{RSS}	_		80		pF
Internal Dusin Industria		Measured From the Contact Screw on Tab to Center of Die Modified MOSFET Symbol Showing the Internal Devices Inductances		3.5		nH
Internal Drain Inductance	L _D	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 SPECIFI	CATIONS	3	.a.			
Source to Drain Diode Voltage	V_{SD}	$T_J = 25^{\circ}C$, $I_{SD} = 10A$, $V_{GS} = 0V$ (Note 1)			2.0	V
Continuous Source to Drain Current	Is	Modified MOSFET			10	Α
Pulse Source to Drain Current (Note 2)	I _{SM}	Symbol Showing the Integral Reverse P-N Junction Diode			40	А
Reverse Recovery Time	t _{rr}	$T_J = 25^{\circ}C$, $I_{SD} = 10A$, $dI_{SD}/dt = 100A/\mu s$	170	390	790	ns
Reverse Recovery Charge Q_{RR} $T_J = 25^{\circ}C$, $I_{SD} = 10A$, I_{SD}/I_{CR} I_{SD}/I_{CR}				4.5	8.2	μC

Notes: 1. Pulse Test: Pulse width ≤ 300µs, Duty Cycle≤2%.

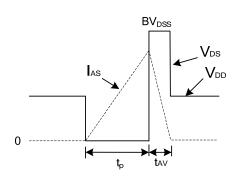
- 2. Repetitive rating: Pulse width limited by maximum junction temperature.
- 3. V_{DD} =50V, starting T_J =25°C, L=9.1mH, R_G =25 Ω , peak I_{AS} = 10A

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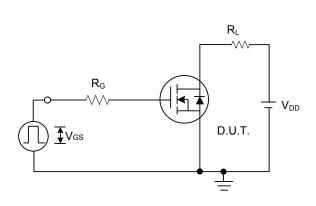
■ TEST CIRCUITS AND WAVEFORMS



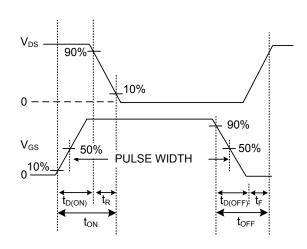
Unclamped Energy Test Circuit



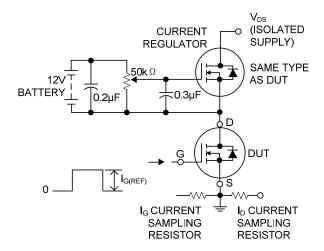
Unclamped Energy Waveforms



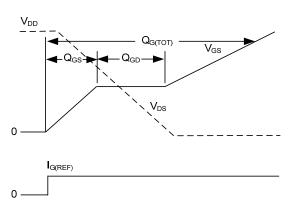
Switching Time Test Circuit



Resistive Switching Waveforms



Gate Charge Test Circuit



Gate Charge Waveforms

■ TYPICAL PERFORMANCE CUVES

100

(Y)
10

OPERATION IN THIS
REGION IS LIMITED BY
T_C=25°C

DC

10

TJ=MAX RATED

SINGLE PULSE

0.1

Forward Bias Safe Operating Area

Drain to Source Voltage, V_{DS} (V)

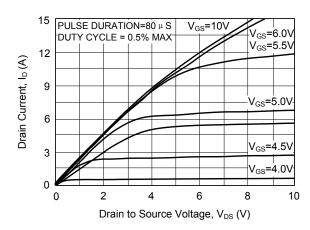
102

10₃

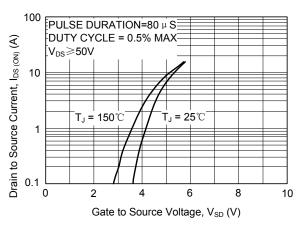
PULSE DURATION=80 µS V_{GS} = 10V DUTY CYCLE = 0.5% MAX $V_{GS} = 6.0V$ 12 V_{GS} = 5.5V Drain Current, ID (A) 9 V_{GS} = 5.0V 6 V_{GS} = 4.5 V 3 √_{GS} = 4.0√ 0 O 40 80 120 160 200 Drain to Source Voltage, VDS (V)

Output Characteristics

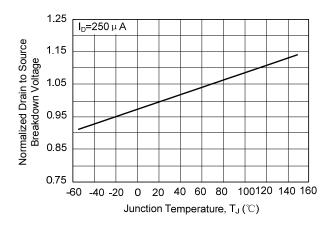
Saturation Characteristics



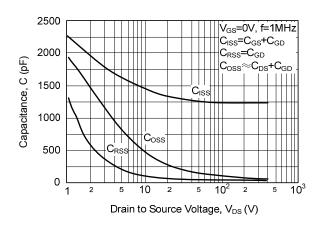
Transfer Characteristics



Normalized Drain to Source Breakdown Voltage vs. Junction Temperature

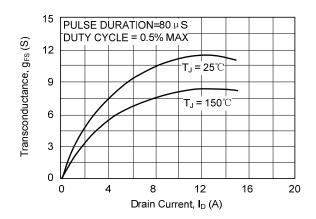


Capacitance vs. Drain to Source Voltage

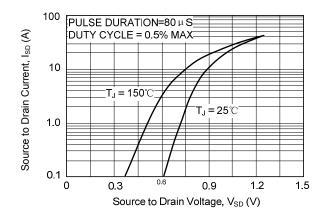


■ TYPICAL PERFORMANCE CUVES (Cont.)

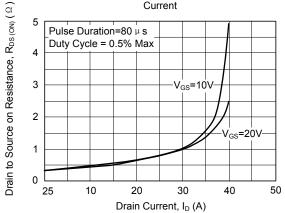
Transconduce vs. Drain Current



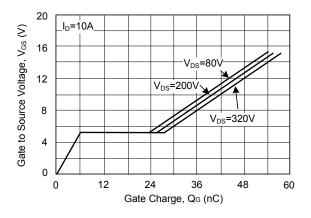
Source to Drain Diode Voltage



Drain to Source on Resistance vs. Voltage and Drain Current



Gate to Source Voltage vs. Gate Charge



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