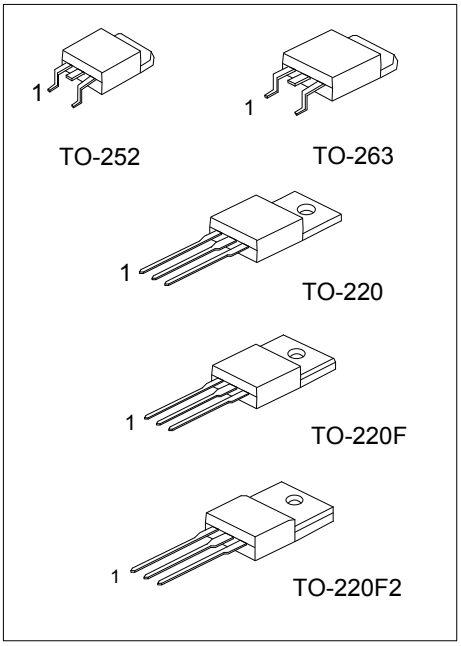
UF640

Power MOSFET

18 A, 200 V, 0.18 OHM, N-CHANNEL POWER MOSFET



■ DESCRIPTION

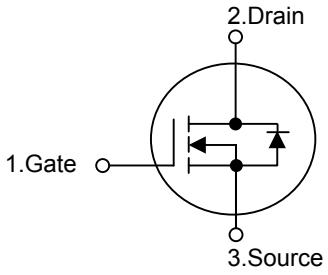
These kinds of n-channel power MOSFET field effect transistor have low conduction power loss, high input impedance, and high switching speed, Linear Transfer Characteristics, so can be use in a variety of power conversion applications.

The **UF640** suitable for resonant and PWM converter topologies.

■ FEATURES

* $R_{DS(ON)}$ =0.18Ω@V_{GS} = 10V.
* Ultra Low gate charge (typical 43nC)
* Low reverse transfer capacitance (C_{RSS} = typical 100 pF)
* Fast switching capability
* Avalanche energy specified
* Improved dv/dt capability, high ruggedness

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen-Free		1	2	3	
UF640L-TA3-T	UF640G-TA3-T	TO-220	G	D	S	Tube
UF640L-TF2-T	UF640G-TF2-T	TO-220F2	G	D	S	Tube
UF640L-TF3-T	UF640G-TF3-T	TO-220F	G	D	S	Tube
UF640L-TN3-R	UF640G-TN3-R	TO-252	G	D	S	Tape Reel
UF640L-TN3-T	UF640G-TN3-T	TO-252	G	D	S	Tube
UF640L-TQ2-R	UF640G-TQ2-R	TO-263	G	D	S	Tape Reel
UF640L-TQ2-T	UF640G-TQ2-T	TO-263	G	D	S	Tube

UF640L-TA3-T (1)Packing Type (2)Package Type (3)Lead Free	(1) R: Tape Reel, T: Tube (2) TA3: TO-220, TF3: TO-220F, TF2: TO-220F2, TN3: TO-252, TQ3: TO-263 (3) G: Halogen Free, L: Lead Free

■ ABSOLUTE MAXIMUM RATING (T_C = 25℃, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	200	V
Drain-Gate Voltage (R_{GS}=20kΩ)		V_{DGR}	200	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current		I_D	18	A
Pulsed Drain Current (Note 2)		I_{DM}	72	A
Single Pulse Avalanche Energy Rating (Note 2)		E_{AS}	580	mJ
Maximum Power Dissipation	TO-220	P_D	123	W
	TO-220F		40	
	TO-220F2		42	
	TO-252		83	
	TO-263		139	
Junction Temperature		T_J	+150	℃
Storage Temperature		T_{STG}	-55 ~ +150	℃

Note: 1. 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.
2. L=3.37mH, V_{DD}=50V, R_G=25Ω, peak I_{AS}=18A, starting T_J=25℃.
3. Pulse width limited by $T_{J(MAX)}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/ TO-220F	θ_{JA}	62.5	°C/W
	TO-220F2/ TO-263		62.5	
	TO-252		110	
Junction to Case	TO-220	θ_{JC}	1.01	°C/W
	TO-220F		3.1	
	TO-220F2		2.9	
	TO-252		1.5	
	TO-263		0.9	

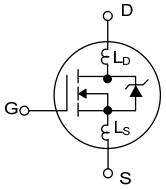
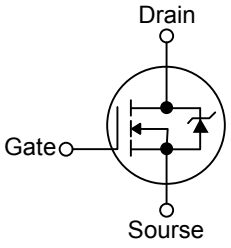
■ ELECTRICAL CHARACTERISTICS (T_C = 25℃, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	200			V
Drain-Source Leakage Current	I_{DSS}	V_{DS} = Rated BV_{DSS}, V_{GS} = 0V			25	μA
Gate-Source Leakage Current	I_{GSS}	V_{GS}= ±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(THR)}$	V_{GS}=V_{DS}, I_D=250μA	2		4	V
On-State Drain Current	$I_{D(ON)}$	V_{DS} >$I_{D(ON)}$ x $R_{DS(ON)}$MAX,V_{GS}=10V	18			A
Drain-Source On Resistance	$R_{DS(ON)}$	I_D=10A, V_{GS}=10V		0.14	0.18	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1MHz		1275		pF
Output Capacitance	C_{OSS}			400		pF
Reverse Transfer Capacitance	C_{RSS}			100		pF

■ ELECTRICAL CHARACTERISTICS(Cont.) (T_C = 25℃, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SWITCHING PARAMETERS						
Turn-ON Delay Time	$t_{D(ON)}$	V_{DD}=100V,I_D≈18A, R_G=9.1Ω,R_L=5.4Ω,		13	21	ns
Turn-ON Rise Time	t_R	MOSFET Switching Times are		50	77	ns
Turn-OFF Delay Time	$t_{D(OFF)}$	Essentially Independent of Operating		46	68	ns
Turn-OFF Fall-Time	t_F	Temperature		35	54	ns
Total Gate Charge	$Q_{G(TOT)}$	V_{GS}=10V, I_D≈18A, V_{DS}=0.8 x Rated		43	64	nC
Gate Source Charge	Q_{GS}	BV_{DSS} Gate Charge is Essentially		8		nC
Gate Drain Charge	Q_{GD}	Independent of Operating Temperature $I_{G(REF)}$ = 1.5mA		22		nC

■ ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
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							
Diode Forward Voltage (Note)	V_{SD}	T_J = 25℃, I_S = 18A, V_{GS} = 0V,				2.0	V
Continuous Source Current (body diode)	I_S	Integral Reverse p-n Junction Diode in the MOSFET				18	A
Pulse Source Current (body diode) (Note)	I_{SM}					72	A
Reverse Recovery Time	t_{rr}	T_J=25℃, I_S=18A, dI_S/dt=100A/μs		120	240	530	ns
Reverse Recovery Charge	Q_{RR}	T_J=25℃, I_S=18A, dI_S/dt=100A/μs		1.3	2.8	5.6	μC

Note: Pulse Test: Pulse width ≤ 300μs, duty cycle ≤ 2%.

■ TEST CIRCUIT

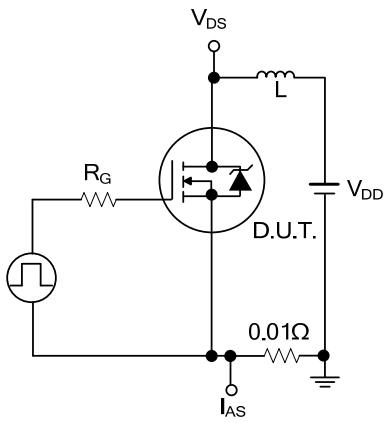


Fig. 1 Unclamped Energy Test Circuit

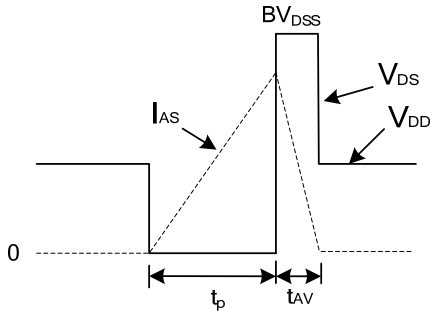


Fig.2 Unclamped Energy Waveforms

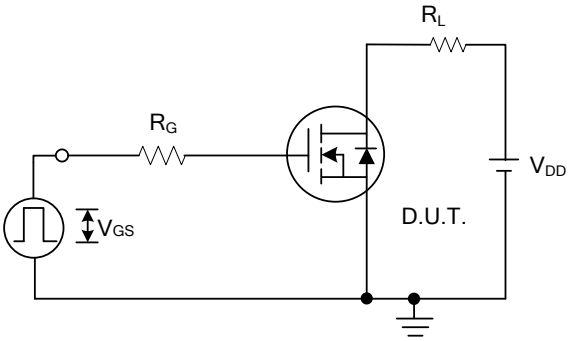


Fig.3 Switching Time Test Circuit

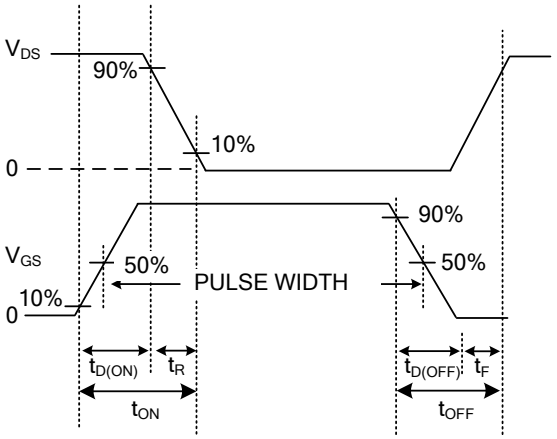


Fig.4 Resistive Switching Waveforms

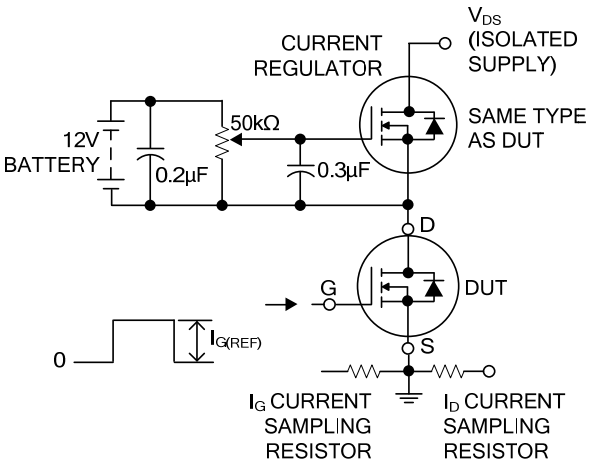


Fig.5 Gate Charge Test Circuit

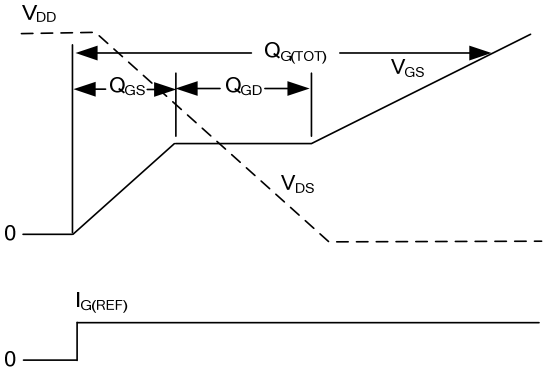
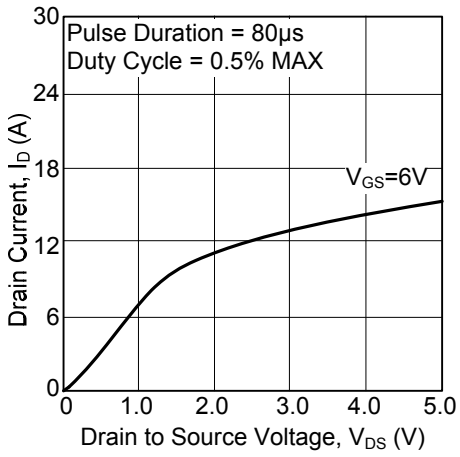


Fig.6 Gate Charge Waveforms

■ TYPICAL CHARACTERISTICS

Saturation Characteristics



Drain to Source On Resistance vs. Gate Voltage And Drain Current