



## UF640

Power MOSFET

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

### DESCRIPTION

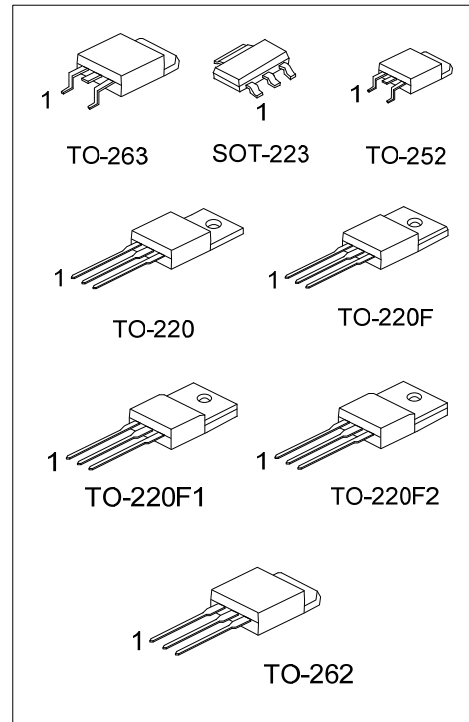
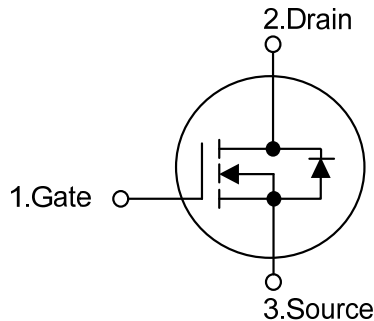
These kinds of n-channel power MOSFET field effect transistor have low conduction power loss, high input impedance, and high switching speed, Linear Transfer Characteristics, so can be use in a variety of power conversion applications.

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

### FEATURES

- \*  $R_{DS(ON)} < 0.18\Omega @ V_{GS}=10V, I_D=10A$
- \* Ultra Low gate charge (typical 43nC)
- \* Low reverse transfer capacitance ( $C_{RSS} = \text{typical } 100 \text{ pF}$ )
- \* 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	
-	UF640G-AA3-R	SOT-223	G	D	S	Tape Reel
UF640L-TA3-T	UF640G-TA3-T	TO-220	G	D	S	Tube
UF640L-TF1-T	UF640G-TF1-T	TO-220F1	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-T2Q-T	UF640G-T2Q-T	TO-262	G	D	S	Tube
UF640L-T2Q-R	UF640G-T2Q-R	TO-262	G	D	S	Tape Reel
UF640L-TQ2-T	UF640G-TQ2-T	TO-263	G	D	S	Tube
UF640L-TQ2-R	UF640G-TQ2-R	TO-263	G	D	S	Tape Reel

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

<p>UF640G-AA3-R</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) AA3: SOT-223, TA3: TO-220, TF1: TO-220F1, TF2: TO-220F2, TF3: TO-220F, TN3: TO-252, T2Q: TO-262, TQ2: TO-263 (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING

SOT-223	TO-220 / TO-220F / TO-220F1 TO-220F2 / TO-252 / TO-262 / TO-263
<p>UF640G □□□□ → Data Code 1</p>	<p>UTC UF640 □ □□□□□□ → Data Code Lot Code ← □□□□□□ 1</p> <p>L: Lead Free G: Halogen Free</p>

■ ABSOLUTE MAXIMUM RATING ( $T_C = 25^\circ\text{C}$ , unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		$V_{DSS}$	200	V
Drain-Gate Voltage ( $R_{GS}=20\text{k}\Omega$ )		$V_{DGR}$	200	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Continuous Drain Current		$I_D$	18	A
Pulsed Drain Current (Note 2)		$I_{DM}$	72	A
Single Pulse Avalanche Energy Rating (Note 2)		$E_{AS}$	242	mJ
Maximum Power Dissipation	SOT-223	$P_D$	66	W
	TO-220		123	
	TO-220F		40	
	TO-220F1/TO-220F2		42	
	TO-252		83	
	TO-262/TO-263		139	
Junction Temperature		$T_J$	+150	$^\circ\text{C}$
Storage Temperature		$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

Notes: 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.

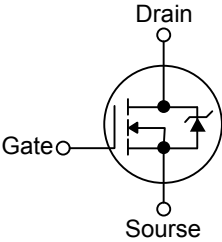
2.  $L=3.37\text{mH}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , peak  $I_{AS}=12\text{A}$ , starting  $T_J=25^\circ\text{C}$

3. Pulse width limited by  $T_{J(\text{MAX})}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	$\theta_{JA}$	57	$^\circ\text{C/W}$
	TO-220/TO-220F		62.5	
	TO-220F1/TO-220F2			
	TO-262/TO-263			
	TO-252			
Junction to Case	SOT-223	$\theta_{JC}$	1.8	$^\circ\text{C/W}$
	TO-220		1.01	
	TO-220F		3.1	
	TO-220F1/TO-220F2		2.9	
	TO-252		1.5	
	TO-262/TO-263		0.9	

■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	I <sub>D</sub> =250μA, V <sub>GS</sub> =0V	200			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = Rated BV <sub>DSS</sub> , V <sub>GS</sub> = 0V			25	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V			±100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(THR)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250μA	2		4	V
Drain-Source On Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =10A		0.14	0.18	Ω
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz		805		pF
Output Capacitance	C <sub>OSS</sub>			240		pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			46		pF
<b>SWITCHING PARAMETERS</b>						
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =100V, I <sub>D</sub> ≈18A, R <sub>G</sub> =9.1Ω, R <sub>L</sub> =5.4Ω, MOSFET Switching Times are Essentially Independent of Operating Temperature		40	52	ns
Turn-ON Rise Time	t <sub>R</sub>			58	72	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			127	152	ns
Turn-OFF Fall-Time	t <sub>F</sub>			86	104	ns
Total Gate Charge	Q <sub>G(TOT)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> ≈18A, V <sub>DS</sub> =0.8 x Rated BV <sub>DSS</sub> Gate Charge is Essentially Independent of Operating Temperature I <sub>G(REF)</sub> = 1.5mA		89	110	nC
Gate Source Charge	Q <sub>GS</sub>			9		nC
Gate Drain Charge	Q <sub>GD</sub>			24		nC
<b>SOURCE TO DRAIN DIODE SPECIFICATIONS</b>						
Diode Forward Voltage (Note)	V <sub>SD</sub>	T <sub>J</sub> =25°C, I <sub>S</sub> =18A, V <sub>GS</sub> =0V,			2.0	V
Continuous Source Current (body diode)	I <sub>S</sub>	Integral Reverse p-n Junction Diode in the MOSFET			18	A
Pulse Source Current (body diode) (Note)	I <sub>SM</sub>					72
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> =25°C, I <sub>S</sub> =18A, dI <sub>S</sub> /dt=100A/μs	120	240	530	ns
Reverse Recovery Charge	Q <sub>RR</sub>	T <sub>J</sub> =25°C, I <sub>S</sub> =18A, dI <sub>S</sub> /dt=100A/μs	1.3	2.8	5.6	μC

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

■ TEST CIRCUIT

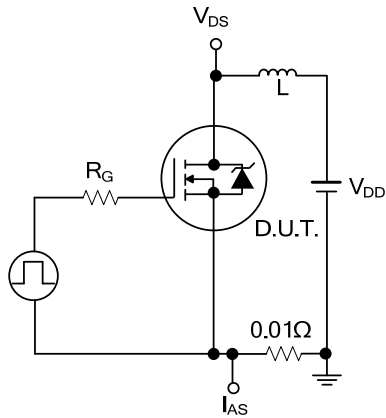


Fig. 1 Unclamped Energy Test Circuit

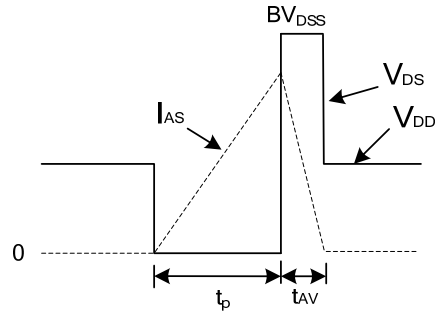


Fig.2 Unclamped Energy Waveforms

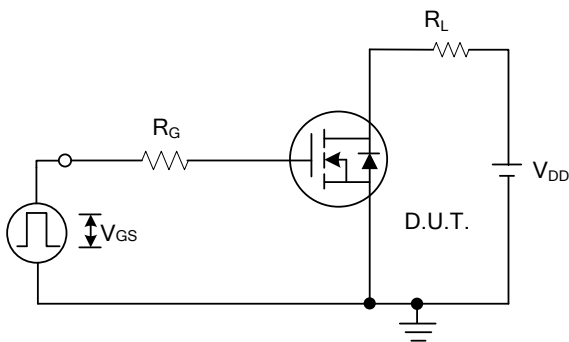


Fig.3 Switching Time Test Circuit

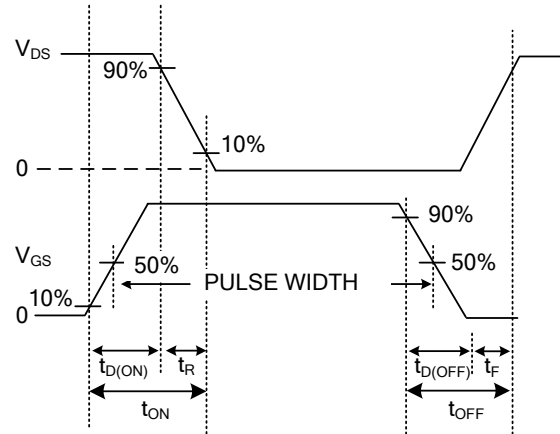


Fig.4 Resistive Switching Waveforms

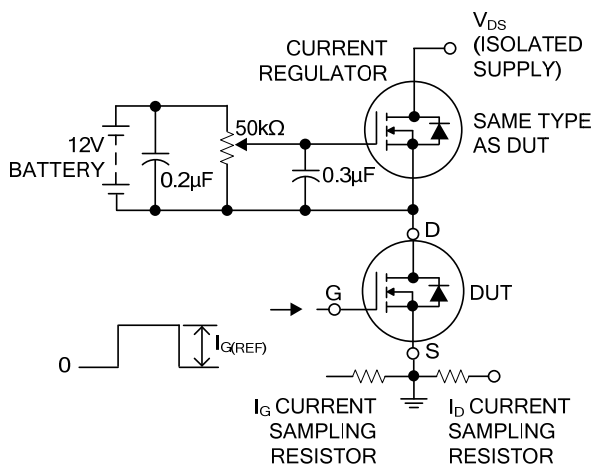


Fig.5 Gate Charge Test Circuit

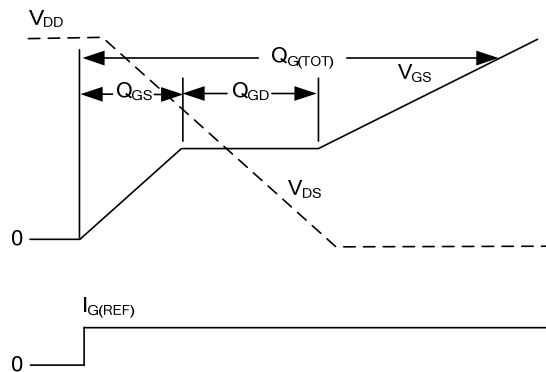
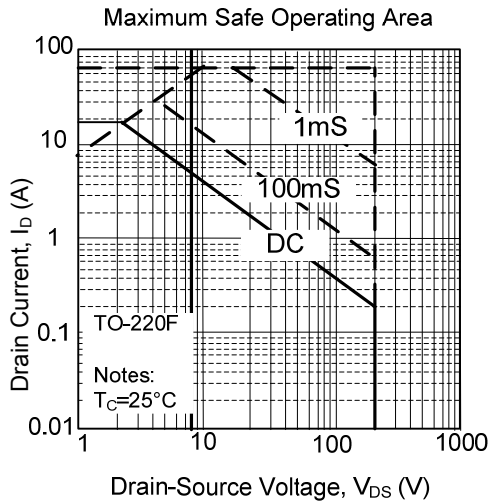
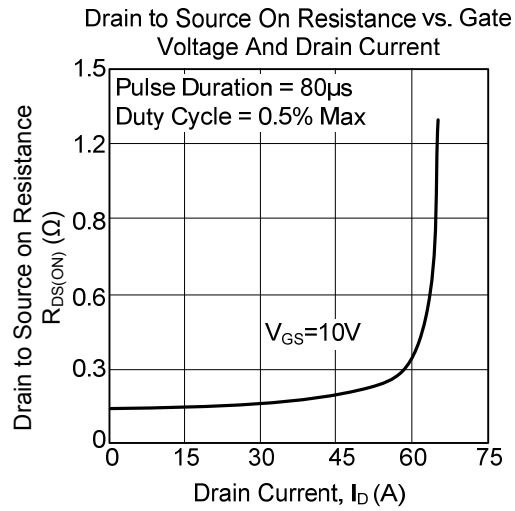
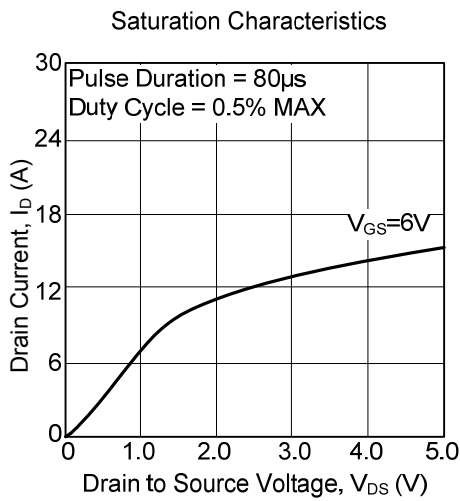


Fig.6 Gate Charge Waveforms

■ TYPICAL CHARACTERISTICS



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