



UF9640

Power MOSFET

11 Amps, 200 Volts P-CHANNEL POWER MOSFET

DESCRIPTION

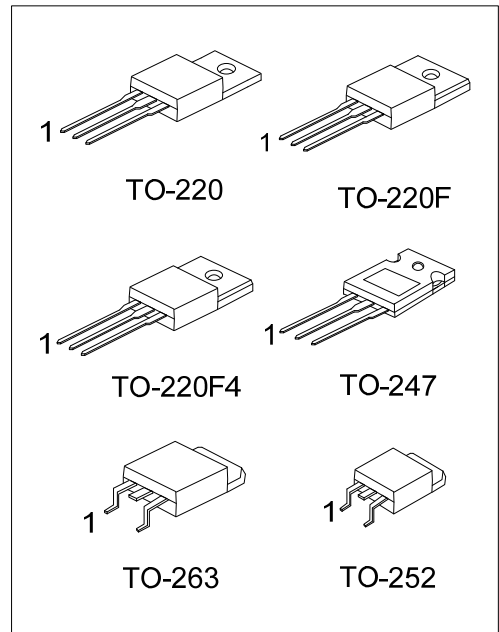
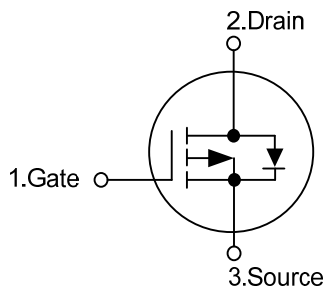
The **UF9640** is a P-channel Power MOSFET that developed by UTC's advanced technology. The device has an advantage of including fast switching, low on-resistance, ruggedized device design and low cost-effectiveness.

This type of package is generally applied in applications in the commercial-industrial field especially suitable for the power consumption at approximately 50W. Because of its low package cost and low thermal resistance, this package is widely applied in the industry field.

FEATURES

- * Fast switching speed
- * P-channel MOSFET
- * Repetitive avalanche rated
- * Simple drive requirements
- * Ease of paralleling

SYMBOL



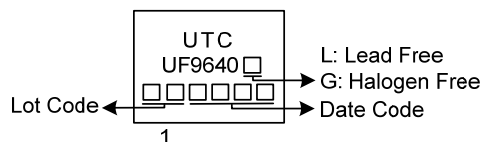
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF9640L-TA3-T	UF9640G-TA3-T	TO-220	G	D	S	Tube
UF9640L-TF3-T	UF9640G-TF3-T	TO-220F	G	D	S	Tube
UF9640L-TF34-T	UF9640G-TF34-T	TO-220F4	G	D	S	Tube
UF9640L-TN3-R	UF9640G-TN3-R	TO-252	G	D	S	Tape Reel
UF9640L-TQ2-T	UF9640G-TQ2-T	TO-263	G	D	S	Tube
UF9640L-TQ2-R	UF9640G-TQ2-R	TO-263	G	D	S	Tape Reel
UF9640L-T47-T	UF9640G-T47-T	TO-247	G	D	S	Tube

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

<p>UF9640G-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TA3: TO-220, TF3: TO-220F, TF34: TO-220F4 T47: TO-247, TN3: TO-252, TQ2: TO-263</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_c=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Gate to Source Voltage		V _{GSS}	±20	V
Avalanche Current (Note 1)		I _{AR}	-11	A
Drain Current	Continuous	I _D	-11	A
	Pulsed (Note 1)	I _{DM}	-44	A
Avalanche Energy	Single Pulsed (Note 2)	E _{AS}	700	mJ
	Repetitive (Note 1)	E _{AR}	13	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	-5.0	V/ns
Power Dissipation	TO-220/TO-263	P _D	132	W
	TO-220F/TO-220F4		46	W
	TO-247		150	W
	TO-252		58	W
Junction Temperature		T _J	+150	°C
Storage Temperature		T _{STG}	-55 ~ +150	°C

Notes: 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	PATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F4/TO-263	θ _{JA}	62.5	°C/W
	TO-247		50	°C/W
	TO-252		110	°C/W
	TO-220/TO-263		0.94	°C/W
Junction to Case	TO-220F/TO-220F4	θ _{JC}	2.71 (Note)	°C/W
	TO-247		0.83	°C/W
	TO-252		2.15 (Note)	°C/W
	TO-252		2.15 (Note)	°C/W

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} =0V, I _D =-250μA	-200			V
Breakdown Voltage Temp. Coefficient	ΔV _{(BR)DSS} /ΔT _J	I _D =-1mA, Referenced to 25°C		-0.20		V/°C
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-200V, V _{GS} =0V			-100	μA
Gate-Source Leakage Current	Forward	V _{GS} =+20V			+100	nA
	Reverse	V _{GS} =-20V			-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _D =-250μA	-2.0		-4.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-6.6A (Note 4)			0.50	Ω
Forward Transconductance	g _{FS}	V _{DS} =-50V, I _D =-6.6A (Note 4)	4.1			S
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} =-25V, V _{GS} =0V, f=1.0MHz		1200		pF
Output Capacitance	C _{OSS}			370		pF
Reverse Transfer Capacitance	C _{RSS}			81		pF
Internal Source Inductance	L _S			7.5		nH
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{DS} =-160V, V _{GS} =-10V, I _D =-11A (Note4)			44	nC
Gate-Source Charge	Q _{GS}				7.1	nC
Gate-Drain Charge	Q _{GD}				27	nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =-100V, I _D =-11A, R _G =9.1Ω, R _D =8.6Ω (Note 4)		14		ns
Turn-ON Rise Time	t _R			43		ns
Turn-OFF Delay Time	t _{D(OFF)}			39		ns
Turn-OFF Fall Time	t _F			38		ns
Internal Drain Inductance	L _D	Between lead, 6mm (0.25in.) from package and center of die contact		4.5		nH
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				-11	A
Maximum Body-Diode Pulsed Current	I _{SM}				-44	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S = -11A, V _{GS} =0V, T _J =25°C			-5.0	V
Body Diode Reverse Recovery Time	t _{rr}	I _F =-11A, T _J =25°C		250	300	ns
Body Diode Reverse Recovery Charge	Q _{rr}	di/dt=100A/μs (Note 4)		2.9	3.6	μC
Forward Turn-On Time	t _{ON}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S +L _D)				

Notes: 1. Repetitive Rating : Pulse width limited by maximum junction temperature

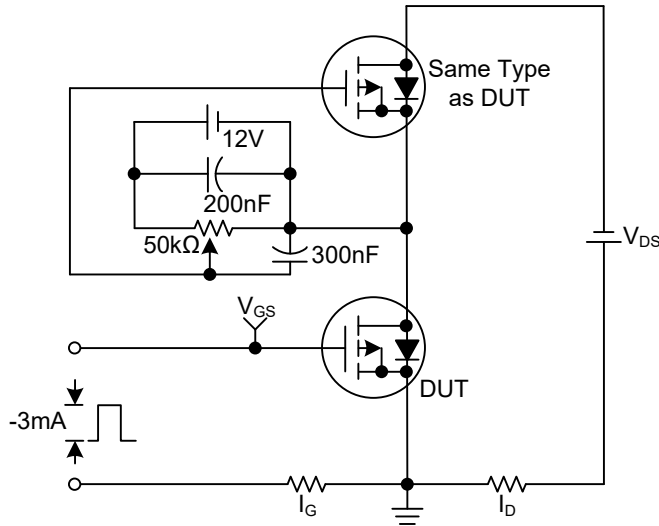
2. V_{DD}=-50V, Starting T_J=25°C, L=8.7mH, R_G=25Ω, I_{AS}=-11A

3. I_{SD} ≤ -11A, di/dt ≤ 150A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J=150°C

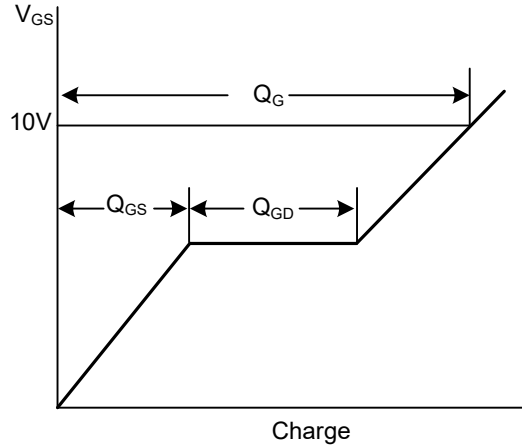
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

■ TEST CIRCUITS AND WAVEFORMS

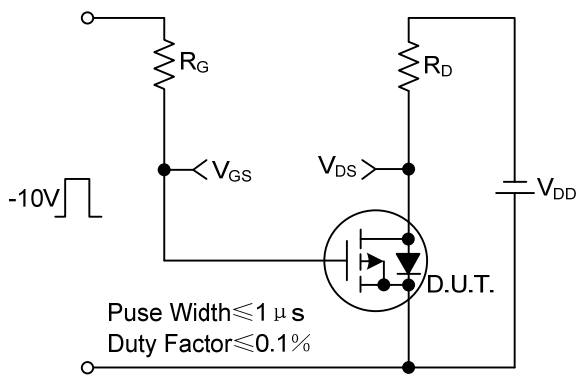
Gate Charge Test Circuit



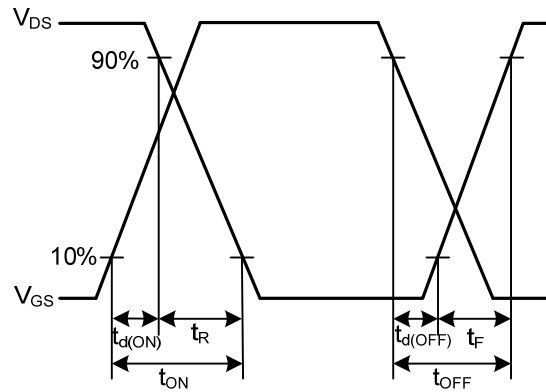
Gate Charge Waveforms



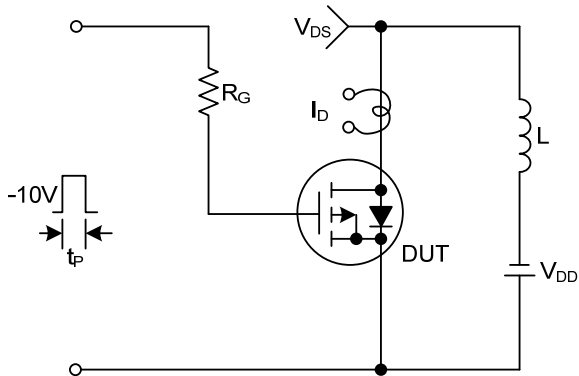
Resistive Switching Test Circuit



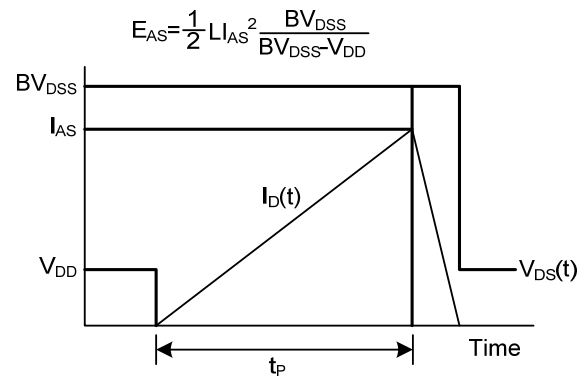
Resistive Switching Waveforms



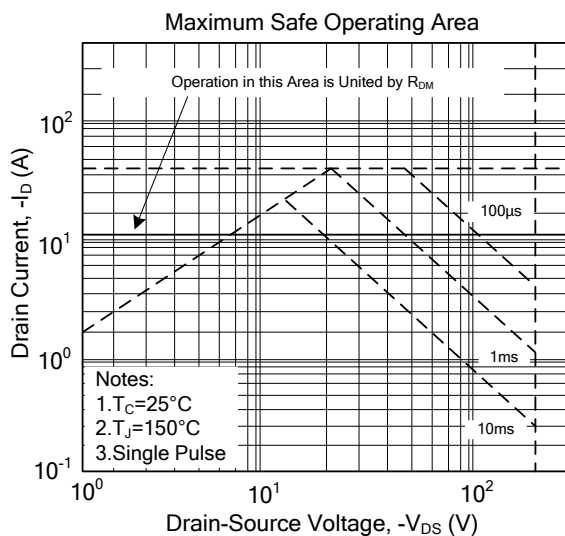
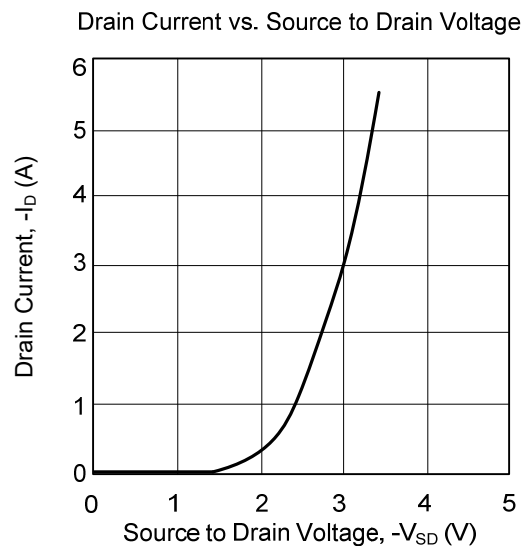
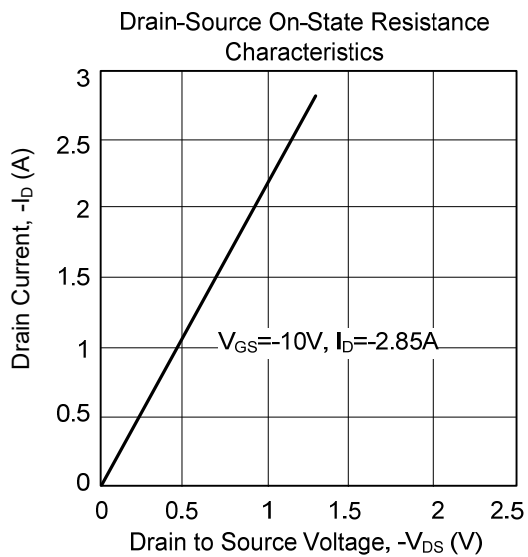
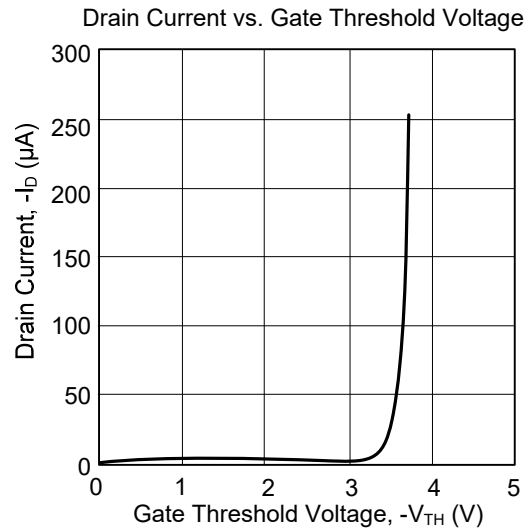
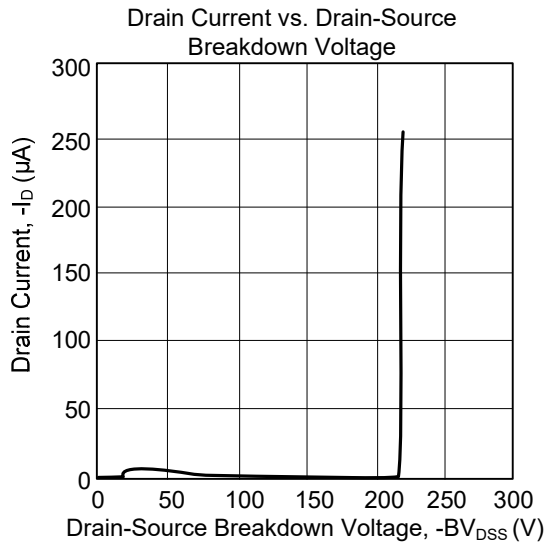
Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



■ TYPICAL CHARACTERISTICS



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