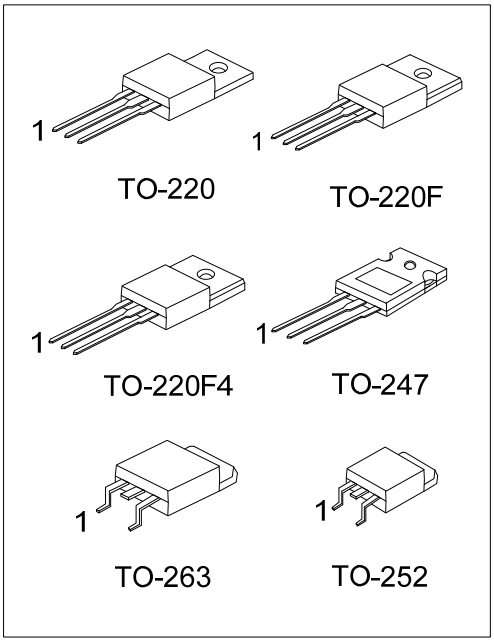
UF9640

Power MOSFET

11 Amps, 200 Volts
P-CHANNEL POWER MOSFET



■ DESCRIPTION

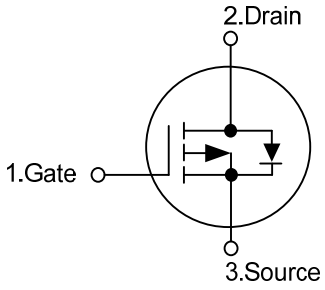
The **UF9640** is a P-channel Power MOSFET that developed by UTC's advanced technlogy. The device has an advantage of including fast switching, low on-resistance, ruggedized device design and low cost-effectiveness.

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

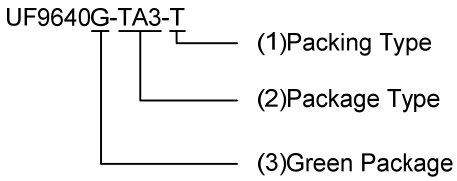
■ SYMBOL



■ ORDERING INFORMATION

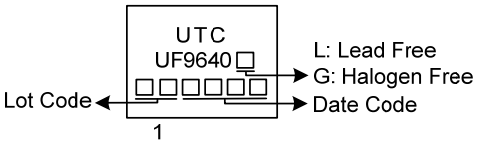
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF9640L-TA3-T	UF9640G-TA3-T	TO-220	G	D	S	Tube
UF9640L-TF3-T	UF9640G-TF3-T	TO-220F	G	D	S	Tube
UF9640L-TF34-T	UF9640G-TF34-T	TO-220F4	G	D	S	Tube
UF9640L-TN3-R	UF9640G-TN3-R	TO-252	G	D	S	Tape Reel
UF9640L-TQ2-T	UF9640G-TQ2-T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



(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF3: TO-220F, TF34: TO-220F4
T47: TO-247, TN3: TO-252, TQ2: TO-263
(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	-200	V
Gate to Source Voltage		V_{GSS}	±20	V
Drain Current	Continuous	I_D	-11	A
	Pulsed (Note 1)	I_{DM}	-44	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	700	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	-2.9	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: 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. Repetitive Rating: Pulse width limited by maximum junction temperature.
3. L = 8.7mH, I_{AS} = -11A, V_{DD} =50V, R_G = 25Ω Starting T_J = 25°C
4. I_{SD} ≤ -11A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ 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
Junction to Case	TO-220/TO-263	θ_{JC}	0.94	°C/W
	TO-220F/TO-220F4		2.71 (Note)	°C/W
	TO-247		0.83	°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.

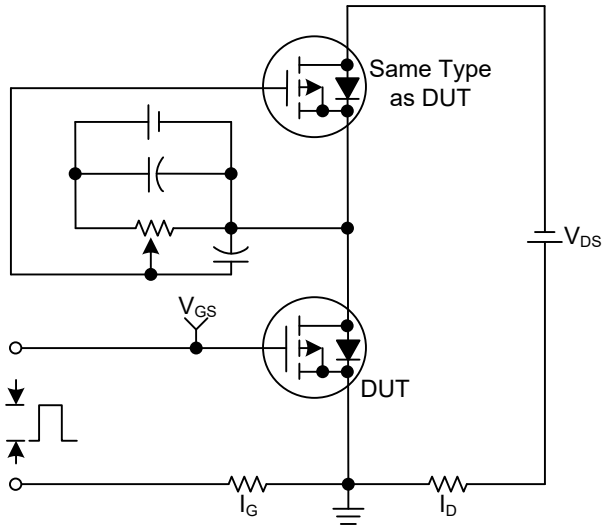
■ ELECTRICAL CHARACTERISTICS (T_J=25°C, unless otherwise specified)

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
Drain-Source Leakage Current		I_{DSS}	V_{DS}=-200V, V_{GS}=0V			-10	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-20V, V_{DS}=0V			-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 (Note2)			0.53	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{DS}=-25V, V_{GS}=0V, f=1.0MHz		1142		pF
Output Capacitance		C_{OSS}			196		pF
Reverse Transfer Capacitance		C_{RSS}			27		pF
SWITCHING PARAMETERS11							
Total Gate Charge		Q_G	V_{DS}=-160V, V_{GS}=-10V, I_D=-11A (Note2)		28		nC
Gate-Source Charge		Q_{GS}			11		nC
Gate-Drain Charge		Q_{GD}			8		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=-100V,I_D=-11A, R_G=3Ω, (Note 2)		7		ns
Turn-ON Rise Time		t_R			18		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			20		ns
Turn-OFF Fall Time		t_F			19		ns
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 dI/dt=100A/μs (Note2)		250		ns
Body Diode Reverse Recovery Charge		Q_{rr}			1577		nC

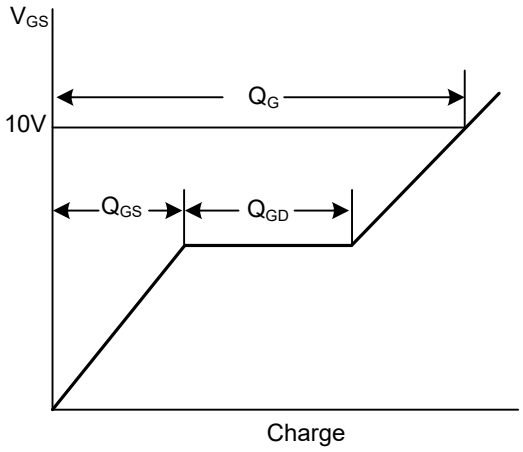
Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

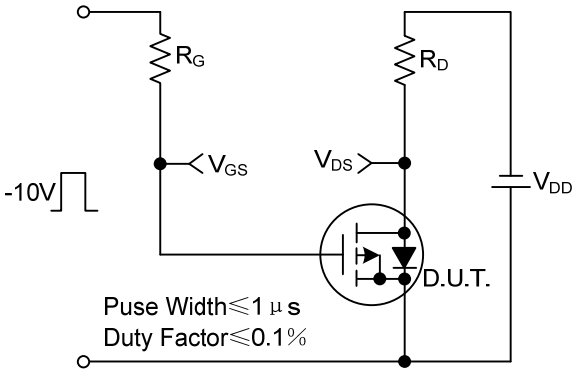
Gate Charge Test Circuit



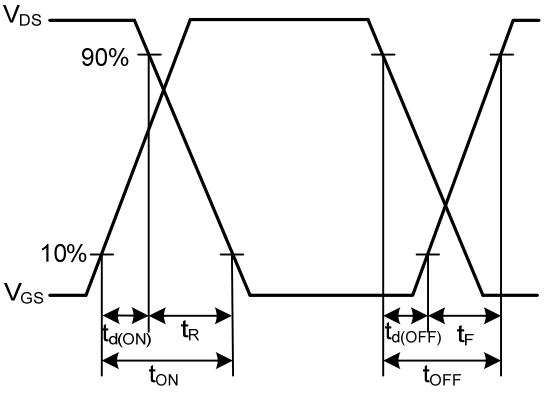
Gate Charge Waveforms



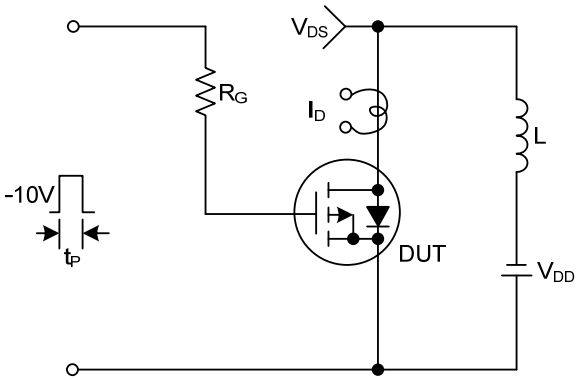
Resistive Switching Test Circuit



Resistive Switching Waveforms

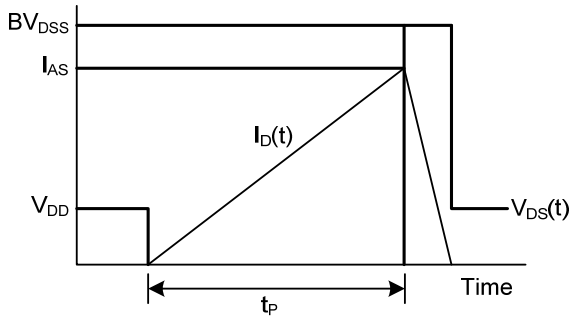


Unclamped Inductive Switching Test Circuit



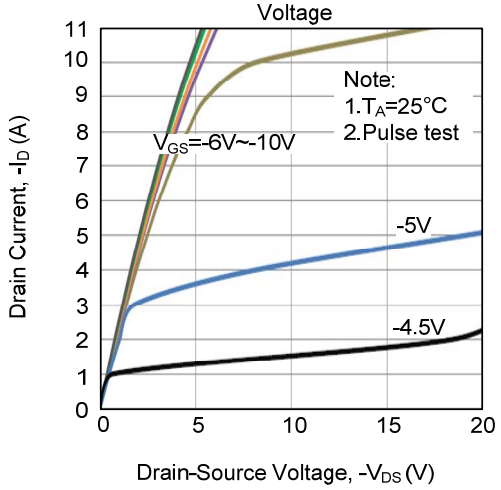
Unclamped Inductive Switching Waveforms

$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$

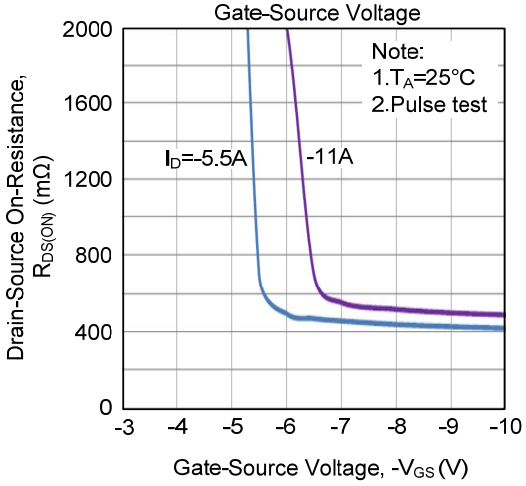


■ TYPICAL CHARACTERISTICS

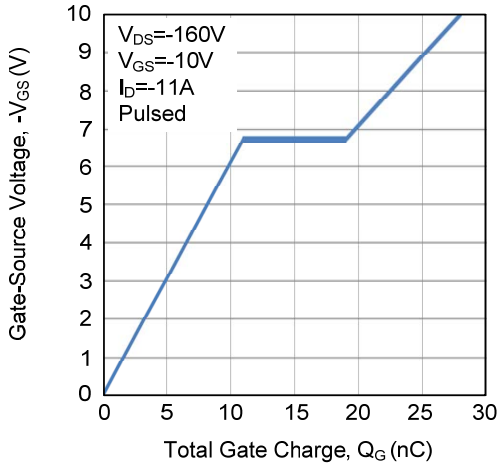
Drain Current vs. Drain-Source Voltage



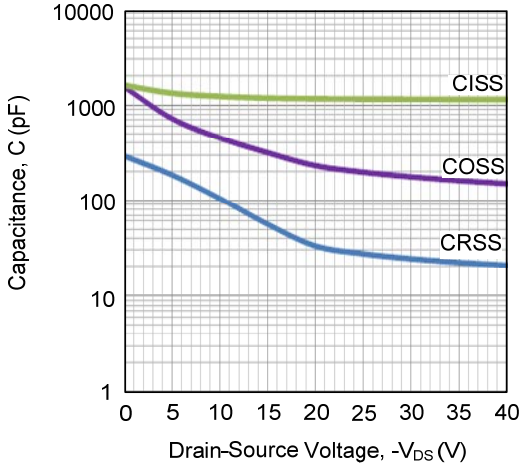
Drain-Source On-Resistance vs. Gate-Source Voltage



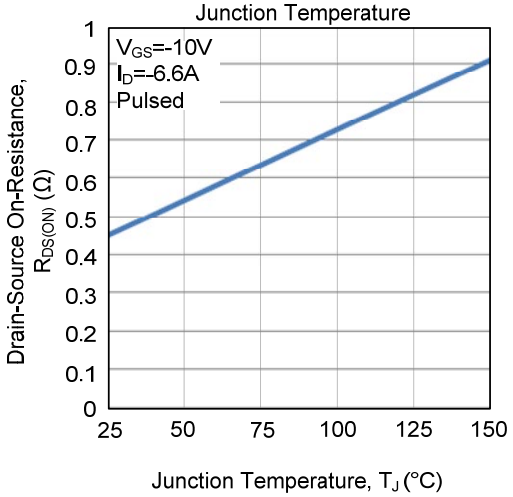
Gate Charge Characteristics



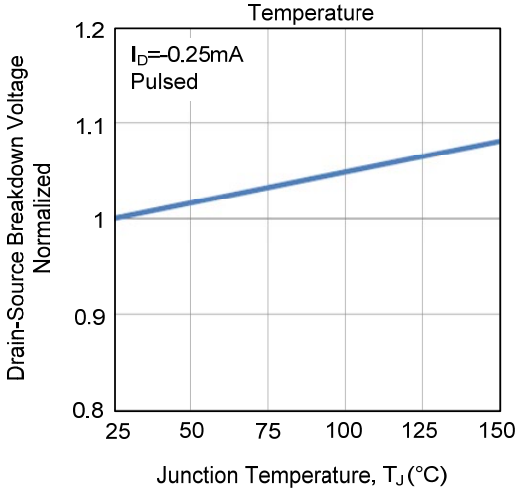
Capacitance Characteristics



Drain-Source On-Resistance vs. Junction Temperature

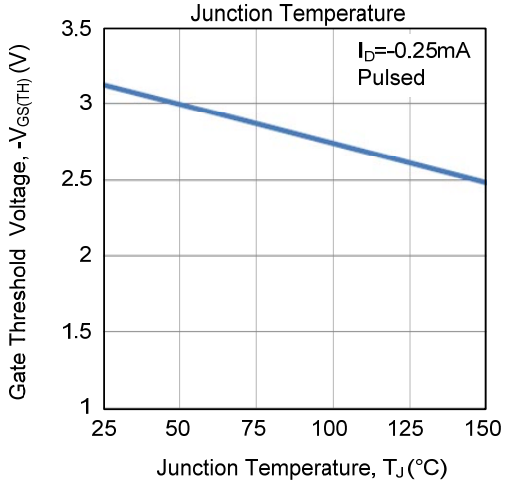


Breakdown Voltage vs. Junction Temperature

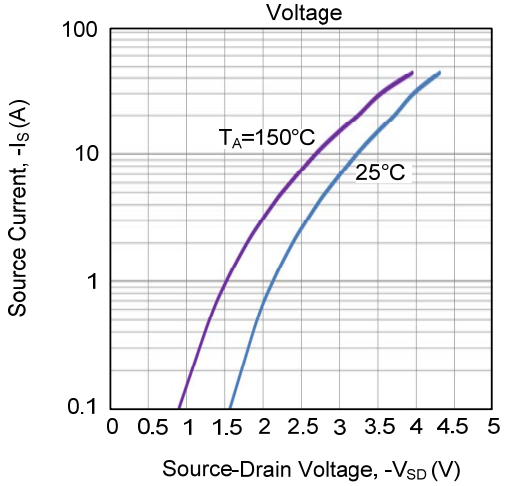


■ TYPICAL CHARACTERISTICS (Cont.)

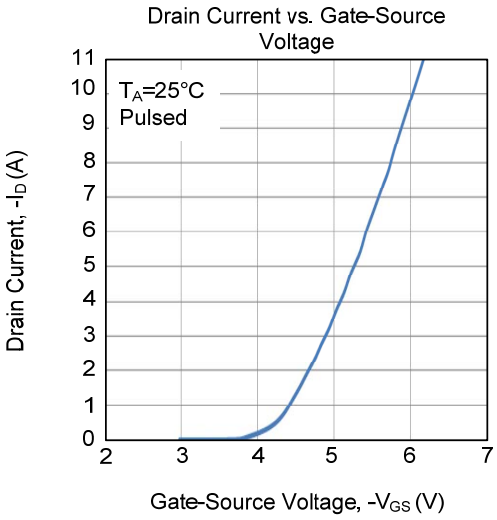
Gate Threshold Voltage vs. Junction Temperature



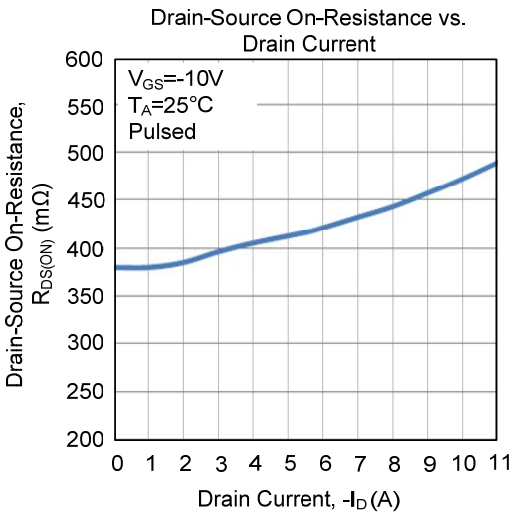
Source Current vs. Source-Drain Voltage



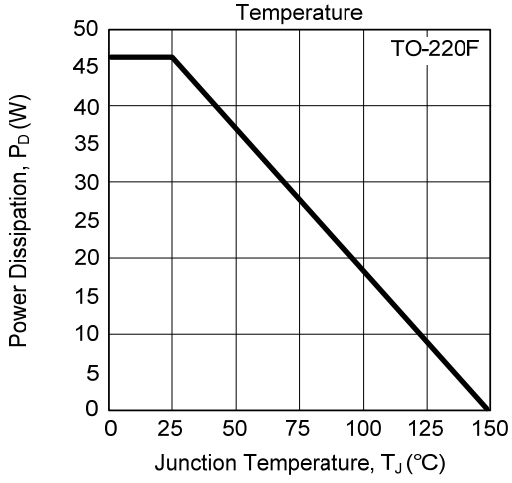
Drain Current vs. Gate-Source Voltage



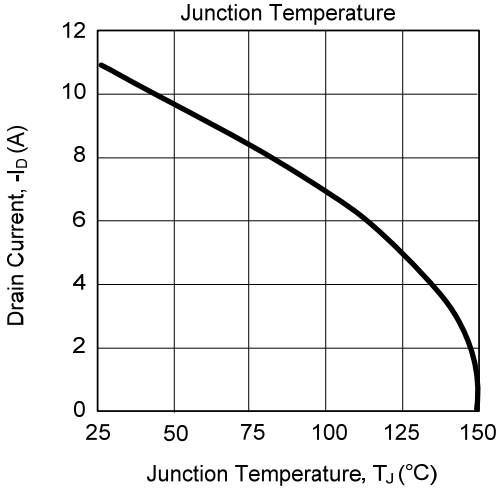
Drain-Source On-Resistance vs. Drain Current



Power Dissipation vs. Junction Temperature



Drain Current vs. Junction Temperature



■ TYPICAL CHARACTERISTICS (Cont.)