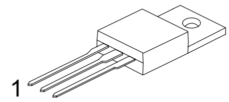
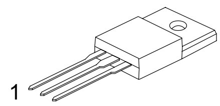
UTC UNISONIC TECHNOLOGIES CO., LTD

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



TO-220



TO-220F

*Pb-free plating product number: UF640L

■ DESCRIPTION

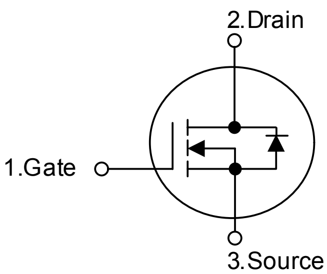
These kinds of n-channel power mos field effect transistor have low conduction power loss, high input impedance, and high switching speed, Linear Transfer Characteristics, so can be use in a variety of power conversion applications.

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

Order Number		Package	Pin Assignment			Packing
Normal	Lead Free Plating		1	2	3	
UF640-TA3-T	UF640L-TA3-T	TO-220	G	D	S	Tube
UF640-TF3-T	UF640L-TF3-T	TO-220F	G	D	S	Tube

UF640L-TA3-T	
(1)Packing Type	(1) T: Tube
(2)Package Type	(2) TA3: TO-220, TF3: TO-220F
(3)Lead Plating	(3) L: Lead Free Plating Blank: Pb/Sn

■ 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	T_C = 25℃	I_D	18	A
	T_C = 100℃		11	A
Pulsed Drain Current (Note 2)		I_{DM}	72	A
Single Pulse Avalanche Energy Rating (Note 3)		E_{AS}	580	mJ
Maximum Power Dissipation		P_D	125	W
Dissipation Derating Factor			1.0	W/℃
Junction Temperature		T_J	+150	℃
Storage Temperature		T_{STG}	-55 ~ +150	℃

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.

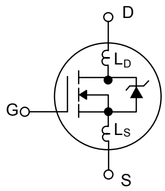
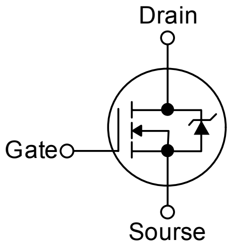
■ THERMAL DATA

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Thermal Resistance, Channel to Ambient	θ_{JA}			62	°C/W
Thermal Resistance, Channel to Case	θ_{JC}			1	°C/W

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = 250μA, V_{GS} = 0V	200			V
Gate Threshold Voltage	$V_{GS(THR)}$	V_{GS} = V_{DS}, I_D = 250μA	2		4	V
Drain-Source Leakage Current	I_{DSS}	V_{DS} = Rated BV_{DSS}, V_{GS} = 0V			25	μA
		V_{DS} = 0.8 x Rated BV_{DSS}, V_{GS} = 0V, T_J = 125℃			250	μA
On-State Drain Current	$I_{D(ON)}$	V_{DS} >$I_{D(ON)}$ x $R_{DS(ON)}$MAX, V_{GS} = 10V	18			A
Gate-Source Leakage Current	I_{GSS}	V_{GS} = ±20V			±100	nA
Drain-Source On Resistance	$R_{DS(ON)}$	I_D = 10A, V_{GS} = 10V		0.14	0.18	Ω
Forward Transconductance	g_{FS}	V_{DS} ≥ 10V, I_D = 11A	6.7	10		S
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
Total Gate Charge (Gate to Source + Gate to Drain)	$Q_{G(TOT)}$	V_{GS} = 10V, I_D ≈ 18A, V_{DS} = 0.8 x Rated BV_{DSS} Gate Charge is Essentially Independent of Operating Temperature $I_{G(REF)}$ = 1.5mA		43	64	nC
Gate-Source Charge	Q_{GS}			8		nC
Gate-Drain "Miller" Charge	Q_{GD}			22		nC
Turn-On Delay Time	$t_{D(ON)}$	V_{DD} = 100V, I_D ≈ 18A, R_{GS} = 9.1Ω, R_L = 5.4Ω, MOSFET Switching Times are Essentially Independent of Operating Temperature		13	21	ns
Rise Time	t_R			50	77	ns
Turn-Off Delay Time	$t_{D(OFF)}$			46	68	ns
Fall Time	t_F			35	54	ns

■ 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 1)	V_{SD}	T_J = 25°C, 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 1)	I_{SM}				72	A
Reverse Recovery Time	t_{RR}	T_J = 25°C, I_S = 18A, dI_S/dt = 100A/µs	120	240	530	ns
Reverse Recovery Charge	Q_{RR}	T_J = 25°C, I_S = 18A, dI_S/dt = 100A/µs	1.3	2.8	5.6	µC

Note 1. Pulse Test: Pulse width ≤ 300µs, duty cycle ≤ 2%.
2. Repetitive Rating: Pulse width limited by maximum junction temperature. See Transient Thermal Impedance curve.
3. L = 3.37mH, V_{DD} = 50V, R_G = 25Ω, peak I_{AS} = 18A, starting T_J = 25°C.

■ TEST CIRCUIT

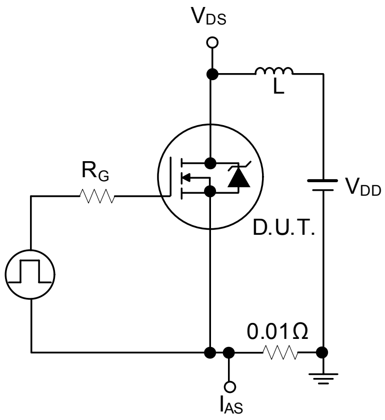


Figure 1A. Unclamped Energy Test Circuit

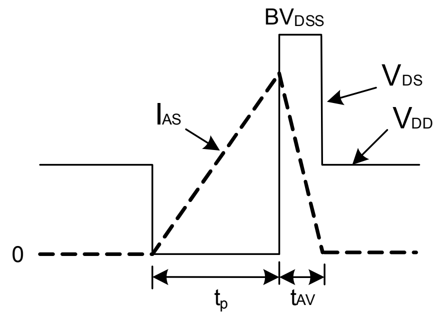


Figure 1B. Unclamped Energy Waveforms

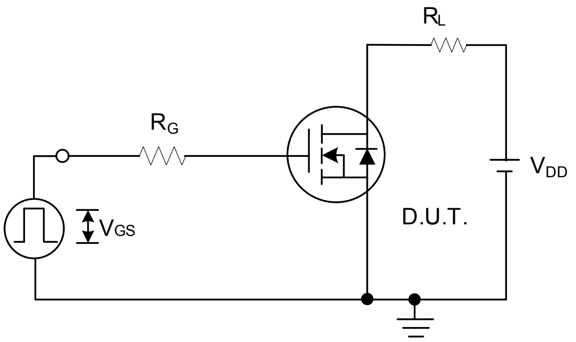


Figure 2A. Switching Time Test Circuit

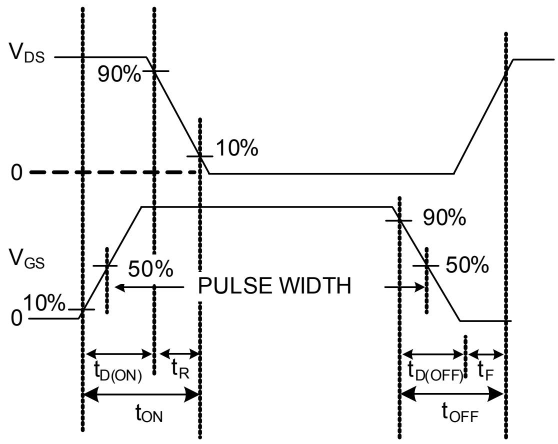


Figure 2B. Resistive Switching Waveforms

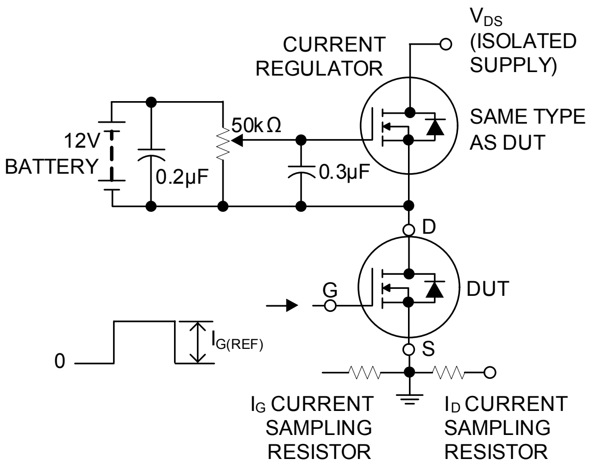


Figure 3A. Gate Charge Test Circuit

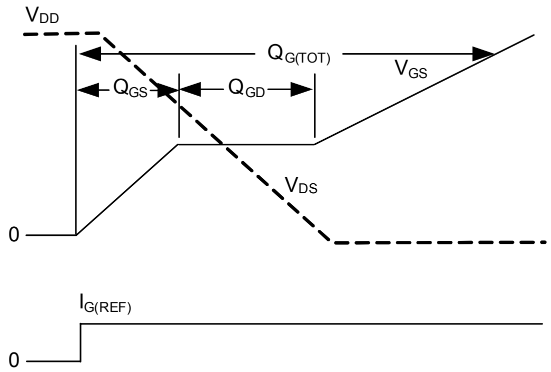


Figure 3B. Gate Charge Waveforms

■ TYPICAL CHARACTERISTICS