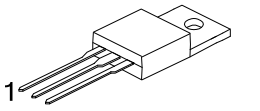
162A, 40V N-CHANNEL POWER MOSFET



TO-220

■ DESCRIPTION

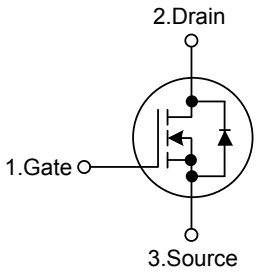
The UTC **UF1404** is a N-channel enhancement power MOSFET using UTC's advanced technology to provide the customers with perfect $R_{DS(ON)}$ and high switching speed.

The UTC **UF1404** is suitable for all commercial-industrial applications at power dissipation levels to approximately 50 watts, etc.

■ FEATURES

* $R_{DS(ON)}$= 4mΩ @ V_{GS}=10V, I_D=95A
* High Switching Speed

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UF1404L-TA3-T	UF1404G-TA3-T	TO-220	G	D	S	Tube

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

UF1404L-TA3-T (1)Packing Type (2)Package Type (3)Lead Free	(1) T: Tube (2) TA3: TO-220 (3) G: Halogen Free, L: Lead Free

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

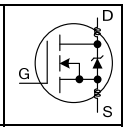
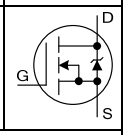
PARAMETER			SYMBOL	RATINGS	UNIT
Drain-Source Voltage			V_{DSS}	40	V
Gate-Source Voltage			V_{GSS}	±20	V
Drain Current	Continuous (V_{GS}=10V)	T_C=25°C	I_D	162 (Note 5)	A
		T_C=100°C		115 (Note 5)	A
	Pulsed (Note 2)	T_C=25°C	I_{DM}	650	A
Avalanche Current (Note 2)			I_{AR}	95	A
Avalanche Energy	Single Pulsed (Note 3)		E_{AS}	519	mJ
	Repetitive (Note 2)		E_{AR}	20	mJ
Peak Diode Recovery dv/dt (Note 3)			dv/dt	5.0	V/ns
Power Dissipation (T_C=25°C)			P_D	200	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. Starting T_J=25°C, L=0.12mH, R_G=25Ω, I_{AS}=95A
4. I_{SD}≤95A, di/dt≤150A/μs, V_{DD}≤BV_{DSS}, T_J≤175°C
5. Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A

■ THERMAL CHARACTERISTICS

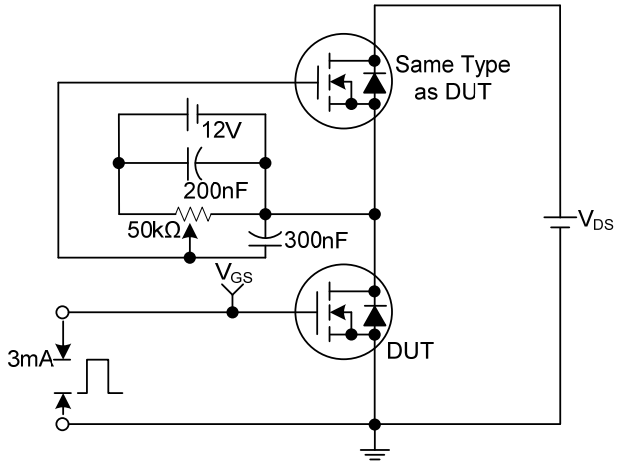
PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62	°C/W
Junction to Case	θ_{JC}	0.625	°C/W

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

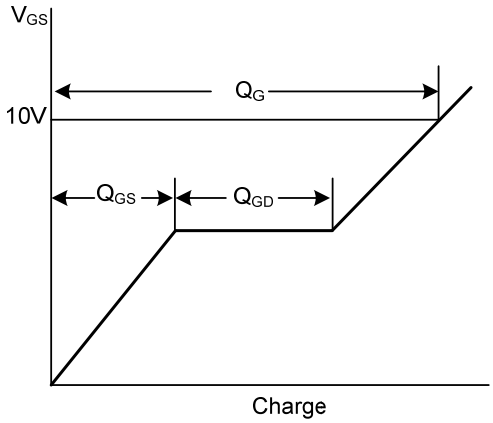
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	40			V
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C, I_D=1mA		0.036		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=40V, V_{GS}=0V			20	μA
			V_{DS}=32V, V_{GS}=0V, T_J=150°C			250	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+20V			+200	nA
	Reverse		V_{GS}=-20V			-200	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=95A (Note 2)		3.5	4	mΩ
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		7.36		nF
Output Capacitance		C_{OSS}			1.68		nF
Reverse Transfer Capacitance		C_{RSS}			0.24		nF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	I_D=95A, V_{DS}=32V, V_{GS}=10V (Note 2)		160	200	nC
Gate to Source Charge		Q_{GS}			35		nC
Gate to Drain Charge		Q_{GD}			42	60	nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=20V, I_D=95A, R_G=2.5Ω, R_D=0.21Ω (Note 2)		17		ns
Rise Time		t_R			140		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			72		ns
Fall-Time		t_F			26		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Internal Drain Inductance		L_D	Between lead, 6 mm (0.25in.) from package and center of die contact 		4.5		nH
Internal Source Inductance		L_S			7.5		nH
Maximum Body-Diode Continuous Current (Note 4)		I_S	MOSFET symbol showing the integral reverse p-n junction diode. 			162	A
Maximum Body-Diode Pulsed Current (Note 1)		I_{SM}				650	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=95A, V_{GS}=0V, T_J=25°C (Note 2)			1.3	V
Body Diode Reverse Recovery Time		t_{RR}	I_F=95A, di/dt=100A/μs, T_J=25°C (Note 2)		71	110	ns
Body Diode Reverse Recovery Charge		Q_{RR}			180	270	μC

Notes: 1. Repetitive rating: pulse width limited by maximum junction temperature
2. Pulse width≤300μs, Duty cycle≤2%
3. C_{OSS} eff. is a fixed capacitance that gives the same charging time as C_{OSS} while V_{DS} is rising from 0 to 80% V_{DSS}
4. Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 75A

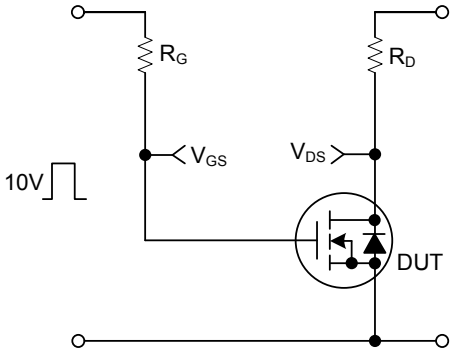
■ TEST CIRCUITS AND WAVEFORMS



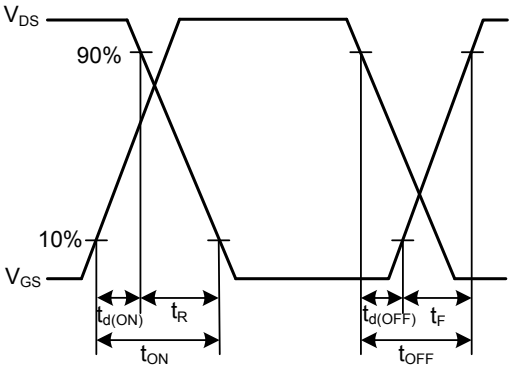
Gate Charge Test Circuit



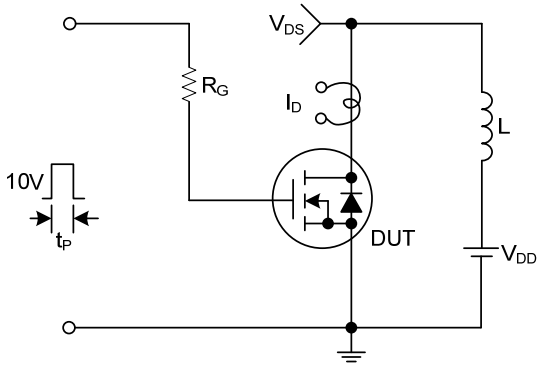
Gate Charge Waveforms



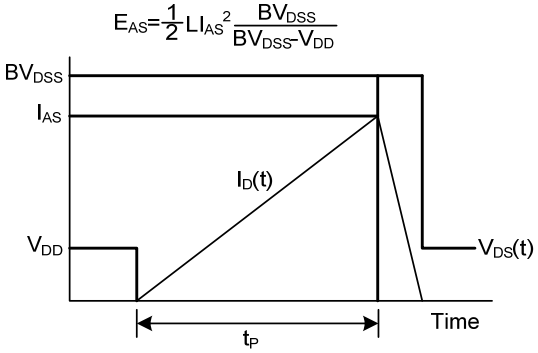
Resistive Switching Test Circuit



Resistive Switching Waveforms

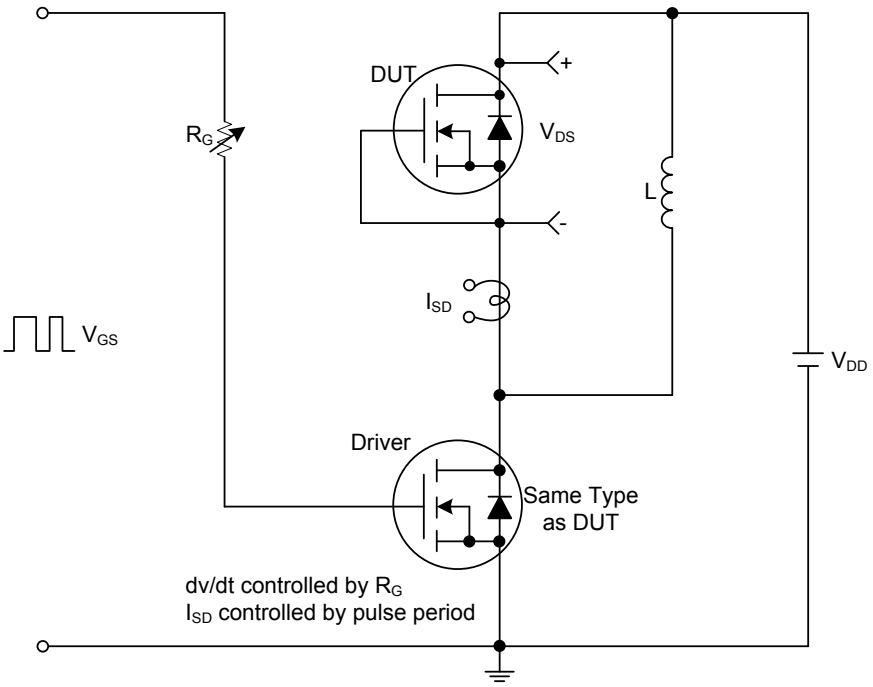


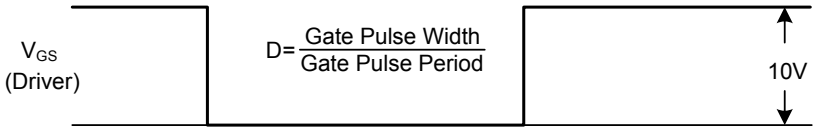
Unclamped Inductive Switching Test Circuit

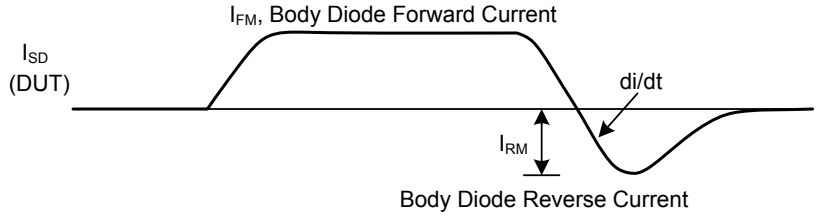


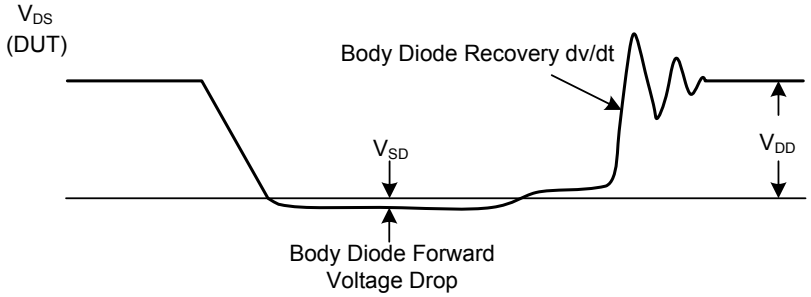
Unclamped Inductive Switching Waveforms

■ TEST CIRCUITS AND WAVEFORMS(Cont.)









Peak Diode Recovery dv/dt Test Circuit and Waveforms