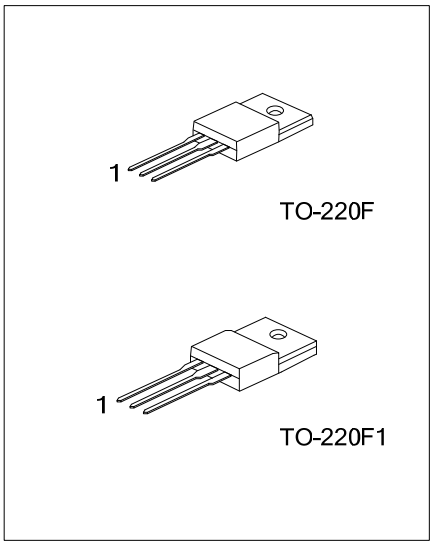
10N65T

Power MOSFET

10A, 650V N-CHANNEL POWER MOSFET



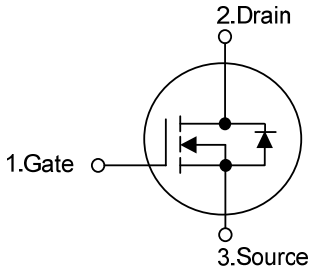
■ DESCRIPTION

The **UT C 10N 65T** is a high voltag e a nd high curre nt p ower MOSFET, designe d to hav e better charac teristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged av alanche char acteristics. This po wer MOSF ET is usua lly used at high speed switching applications in power supplies, PWM motor co ntrols, h igh efficient D C to D C converters and b ridge circuits.

■ FEATURES

* $R_{DS(ON)}$ <0.95Ω@V_{GS} =10V
* Fast switching
* 100% avalanche tested
* Improved dv/dt capability

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
10N65TL-TF3-T	10N65TG-TF3-T	TO-220F	G	D	S	Tube
10N65TL-TF1-T	10N65TG-TF1-T	TO-220F1	G	D	S	Tube

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

10N65TL-TF3-T (1)Packing Type (2)Package Type (3)Lead Free	(1) T: Tube (2) TF3: TO-220F, TF1: TO-220F1 (3) L: Lead Free, G: Halogen Free

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

PARAMETER SYMBOL			RATINGS	UNIT
Drain-Source Voltage		V_{DSS} 650		V
Gate-Source Voltage		V_{GSS} ±	30	V
Avalanche Current (Note 2)		I_{AR} 10		A
Drain Current	Continuous I	$_D$ 10		A
	Pulsed (Note 2)	I_{DM} 38		A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS} 90		mJ
	Repetitive (Note 2)	E_{AR} 15.6		mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation		P_D 50		W
Junction Temperature		T_J +	150	°C
Operating Temperature		T_{OPR}	-55 ~ +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 = 1.8mH, I_{AS} = 10A, V_{DD} = 50V, R_G = 25 Ω Starting T_J = 25°C
4. I_{SD} ≤ 9.5A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

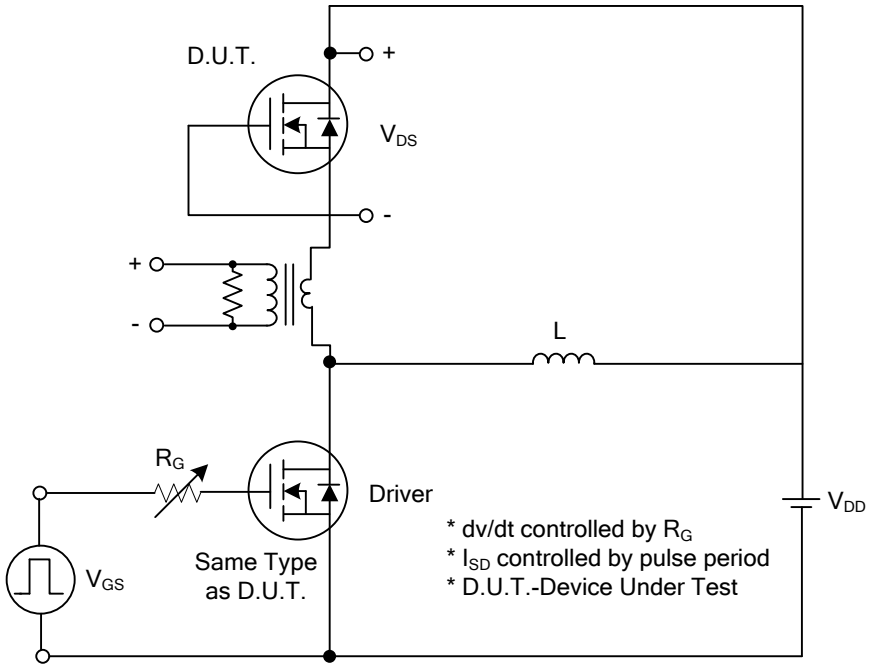
PARAMETER SYMBOL		RATING	UNIT
Junction to Ambient	θ_{JA}	62.5	°C/W
Junction to Case	θ_{JC}	2.5	°C/W

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

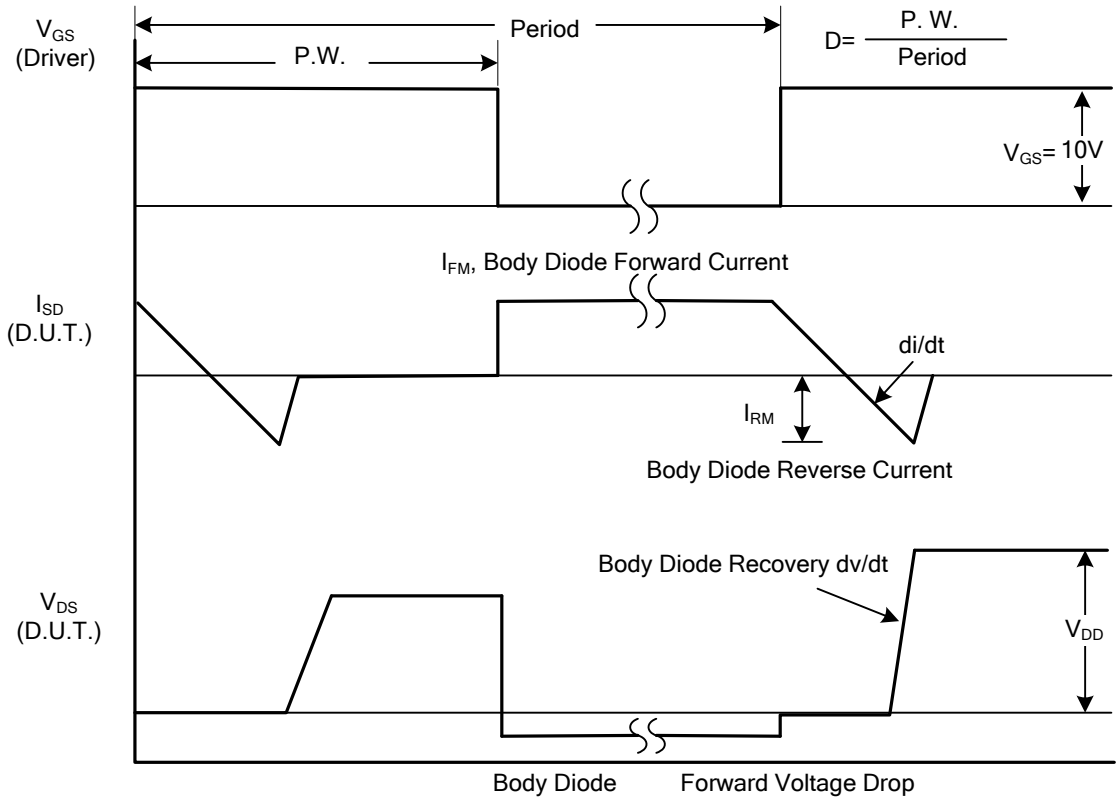
PARAMETER SYMBOL			TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D= 250μA 650				V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=650V, V_{GS}=0V			1	μA
			V_{DS}=520V, V_{GS}=0V, T_J=125°C			100	μA
Gate-Source Leakage Current	Forward	I_{GSS}	V_{GS}=30V, V_{DS}=0V			100	nA
	Reverse V		$_{GS}$=-30V, V_{DS}=0V			-100	nA
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I_D=250 μA, Referenced to 25°C		0.7		V/°C
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=4.75A		0.88	0.95	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1.0 MHz	125	0	2040	pF
Output Capacitance		C_{OSS}			120	215	pF
Reverse Transfer Capacitance		C_{RSS}			13	24	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD}=30V, I_D=0.5A, R_G=25Ω (Note1, 2)	38		55	ns
Turn-On Rise Time		t_R			48	130	ns
Turn-Off Delay Time		$t_{D(OFF)}$			316	330	ns
Turn-Off Fall Time		t_F			70	150	ns
Total Gate Charge		Q_G	V_{DS}=50V, I_D=10A, V_{GS}=10V (Note1, 2)	100		120	nC
Gate-Source Charge		Q_{GS}			20		nC
Gate-Drain Charge		Q_{GD}			19		nC
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S=10A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				10	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				38	A
Reverse Recovery Time		t_{rr}	V_{GS}=0V, I_S=10A, dI_F/dt=100A/μs (Note1)	420			ns
Reverse Recovery Charge		Q_{RR}			4.2		μC

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

■ TEST CIRCUITS AND WAVEFORMS

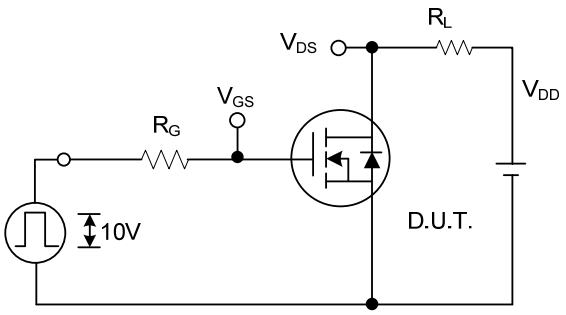


Peak Diode Recovery dv/dt Test Circuit

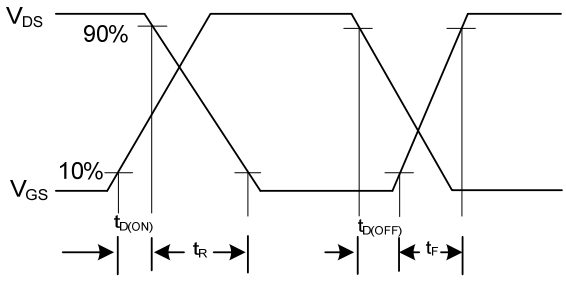


Peak Diode Recovery dv/dt Waveforms

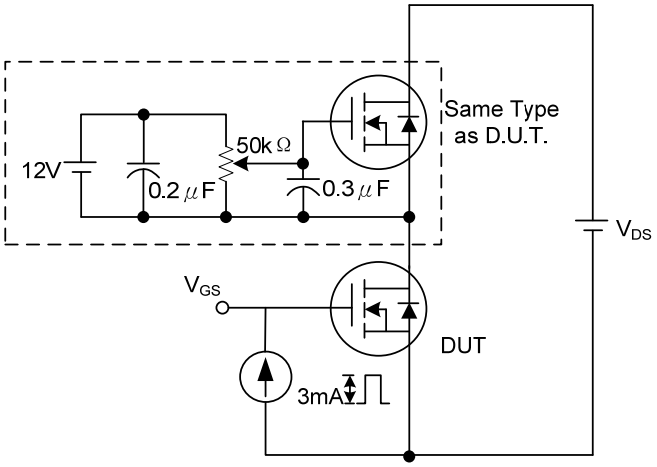
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



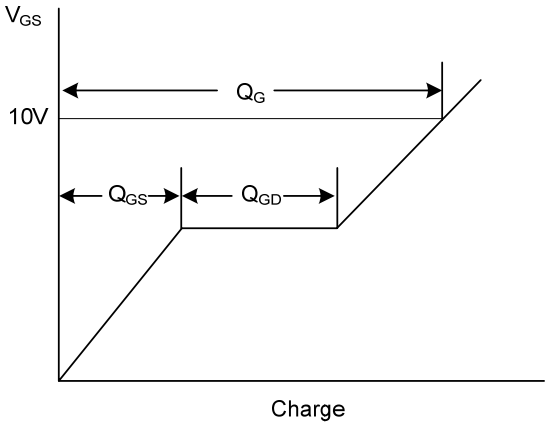
S witching Test Circuit



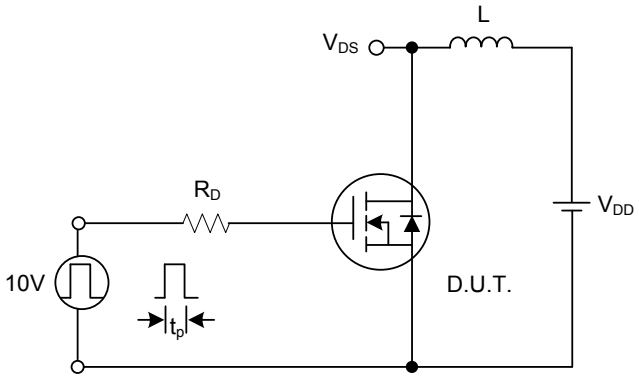
Switching Waveforms



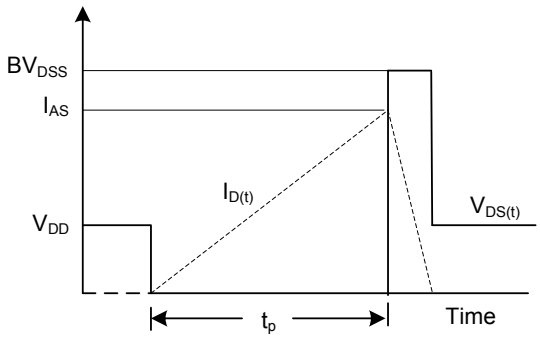
Gate Charge Test Circuit



G ate Charge Waveform



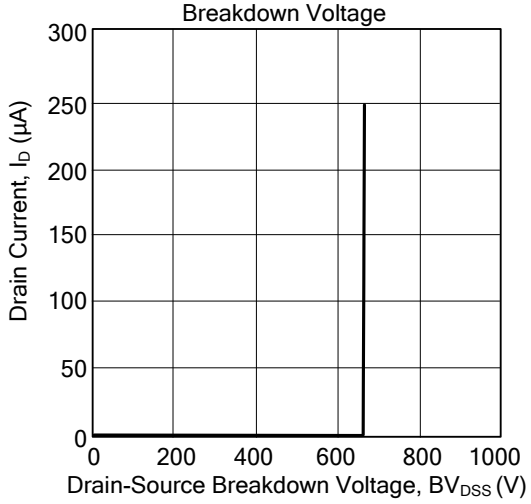
Unclamped Inductive Switching Test Circuit



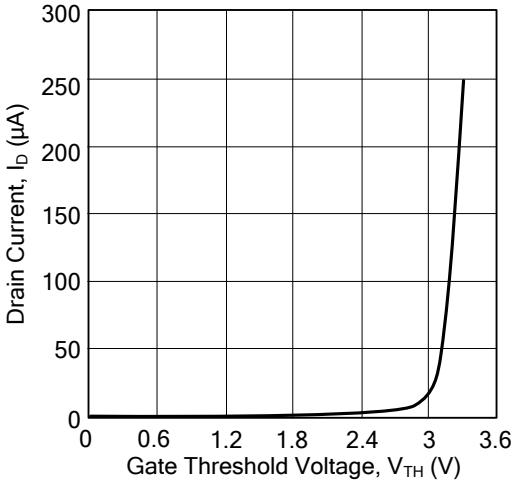
Unclamped Inductive Switching Waveforms

■ TYPICAL CHARACTERISTICS

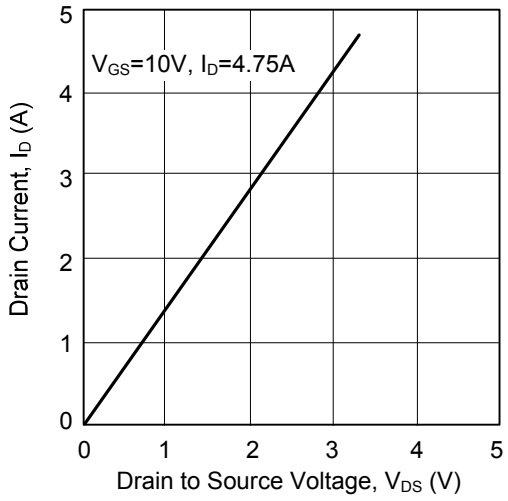
Drain Current vs. Drain-Source Breakdown Voltage



Drain Current vs. Gate Threshold Voltage



Drain-Source On-State Resistance Characteristics



Drain Current vs. Source to Drain Voltage