



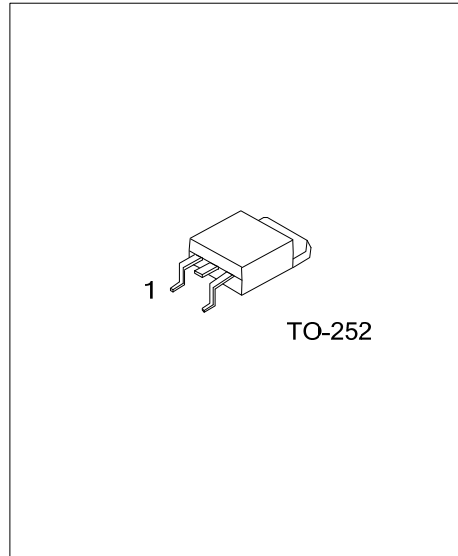
F5N50K-TC

Power MOSFET

5.0A, 500V N-CHANNEL POWER MOSFET

DESCRIPTION

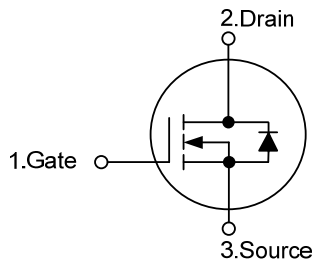
The UTC **F5N50K-TC** is a N-Channel enhancement mode silicon gate power MOSFET with Fast Body Diode, is designed high voltage, high speed power switching applications such, is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient AC to DC converters and bridge circuits.



FEATURES

- * $R_{DS(ON)} \leq 1.8 \Omega @ V_{GS}=10V, I_D=2.5A$
- * Fast body diode MOSFET technology
- * 100% avalanche tested
- * High switching speed

SYMBOL



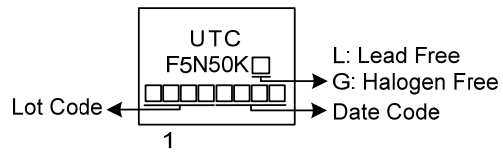
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
F5N50KL-TN3-R	F5N50KG-TN3-R	TO-252	G	D	S	Tape Reel

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

F5N50KG-TN3-R	(1)Packing Type	(1) R: Tape Reel
	(2)Package Type	(2) TN3: TO-252
	(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING



■ ABSOLUTE MAXIMUM RATINGS ($T_c=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	500	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	5	A
	Pulsed (Note 2)	I_{DM}	20	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	104	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	6.3	V/ns
Power Dissipation		P_D	54	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

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. $L = 16\text{mH}$, $I_{AS} = 3.6\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 5.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient		θ_{JA}	110	$^\circ\text{C}/\text{W}$
Junction to Case		θ_{JC}	2.3	$^\circ\text{C}/\text{W}$

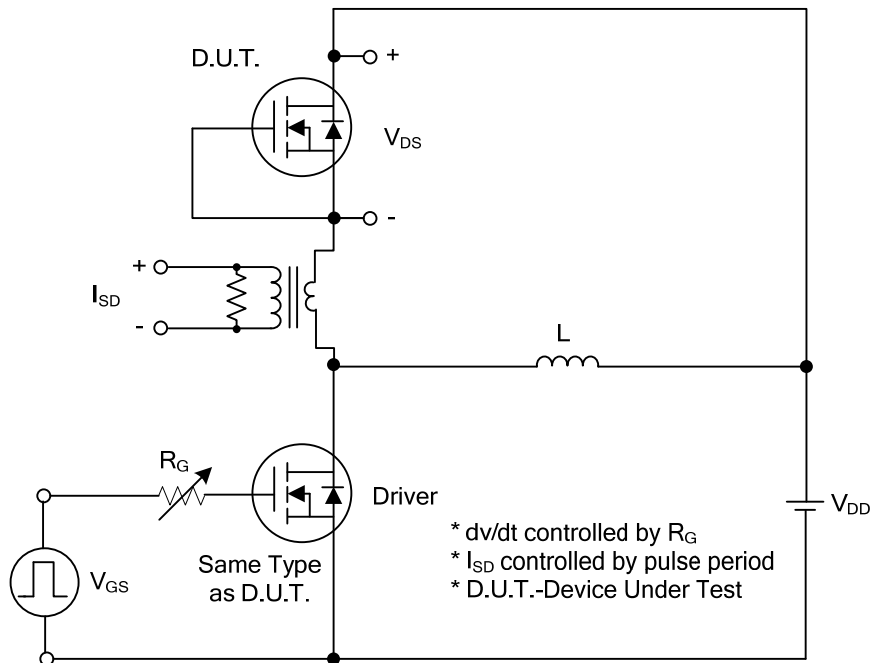
■ ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
OFF CHARACTERISTICS								
Drain-Source Breakdown Voltage		BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	500			V	
Drain-Source Leakage Current		I_{DSS}	$V_{DS}=500\text{V}$, $V_{GS}=0\text{V}$			10	μA	
Gate- Source Leakage Current	Forward	I_{GSS}	$V_{GS}=30\text{V}$, $V_{DS}=0\text{V}$			100	nA	
	Reverse		$V_{GS}=-30\text{V}$, $V_{DS}=0\text{V}$			-100	nA	
ON CHARACTERISTICS								
Gate Threshold Voltage		$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	2.0		4.0	V	
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=2.5\text{A}$			1.8	Ω	
DYNAMIC PARAMETERS								
Input Capacitance		C_{ISS}	$V_{GS}=0\text{V}$, $V_{DS}=25\text{V}$, $f=1.0\text{MHz}$		585		pF	
Output Capacitance		C_{OSS}				58		pF
Reverse Transfer Capacitance		C_{RSS}			7.0			pF
SWITCHING PARAMETERS								
Total Gate Charge (Note 1)		Q_G	$V_{DS}=200\text{V}$, $V_{GS}=10\text{V}$, $I_D=5.0\text{A}$, $I_G=1\text{mA}$ (Note 1, 2)		5.2		nC	
Gate to Source Charge		Q_{GS}			2.8		nC	
Gate to Drain Charge		Q_{GD}			1.1		nC	
Turn-ON Delay Time (Note 1)		$t_{D(ON)}$	$V_{DD}=30\text{V}$, $V_{GS}=10\text{V}$, $D=0.75\text{A}$, $R_G = 25\Omega$ (Note 1, 2)		7.6		ns	
Rise Time		t_R			18.6		ns	
Turn-OFF Delay Time		$t_{D(OFF)}$			36		ns	
Fall-Time		t_F			18		ns	
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS								
Maximum Body-Diode Continuous Current		I_S				5	A	
Maximum Body-Diode Pulsed Current		I_{SM}				20	A	
Drain-Source Diode Forward Voltage (Note 1)		V_{SD}	$I_S=5.0\text{A}$, $V_{GS}=0\text{V}$			1.4	V	
Body Diode Reverse Recovery Time (Note 1)		t_{rr}	$I_S=5.0\text{A}$, $V_{GS}=0\text{V}$,		102		ns	
Body Diode Reverse Recovery Charge		Q_{rr}	$di_f/dt=100\text{A}/\mu\text{s}$		0.33		μC	

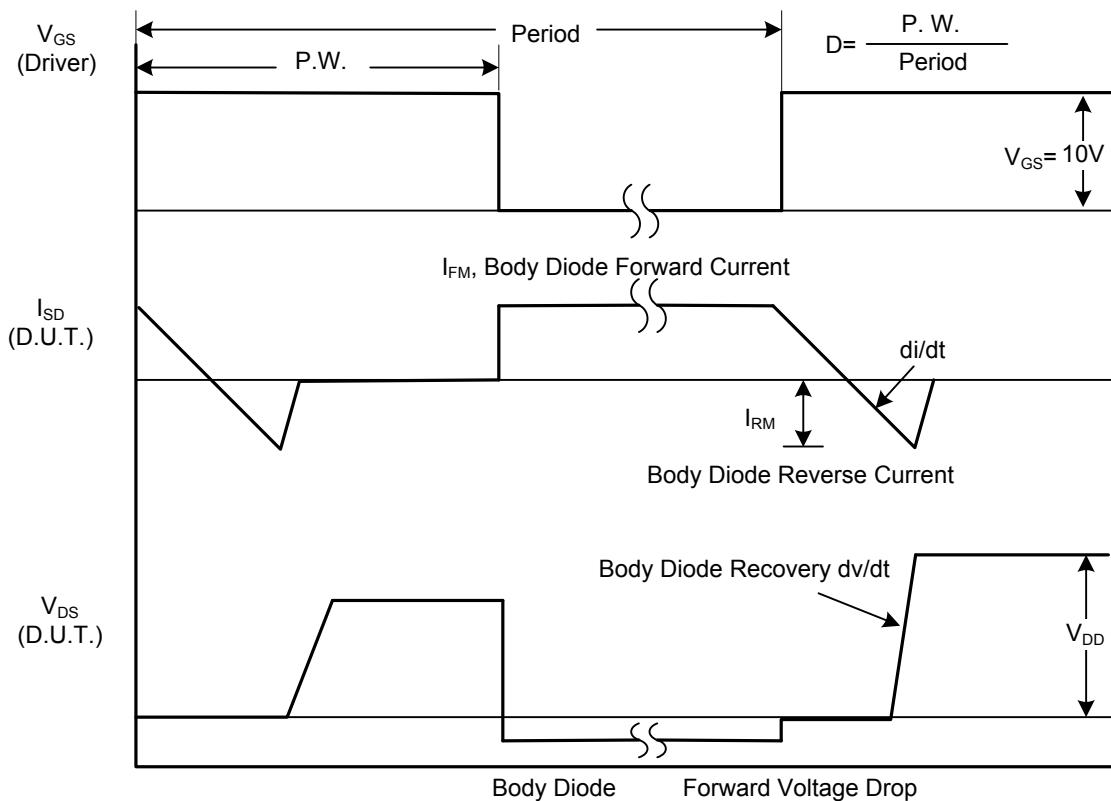
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

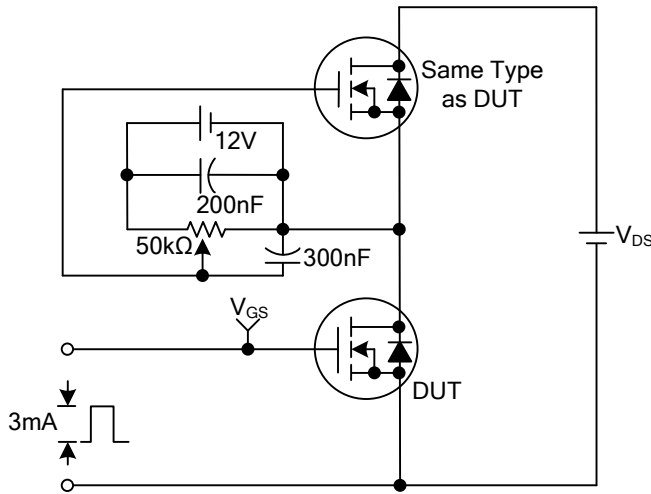


Peak Diode Recovery dv/dt Test Circuit

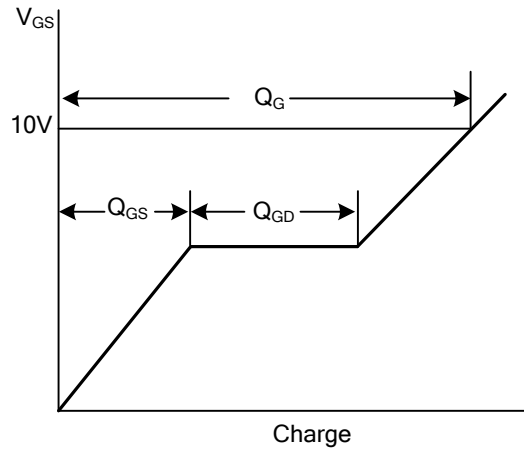


Peak Diode Recovery dv/dt Waveforms

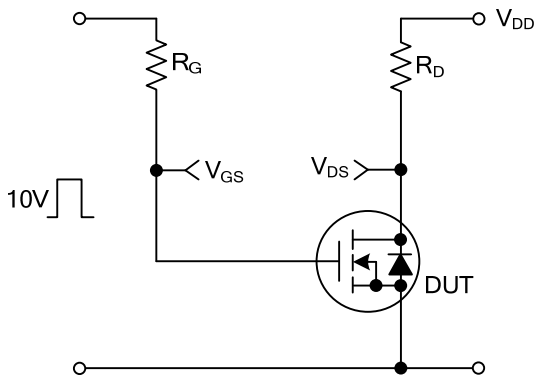
TEST CIRCUITS AND WAVEFORMS



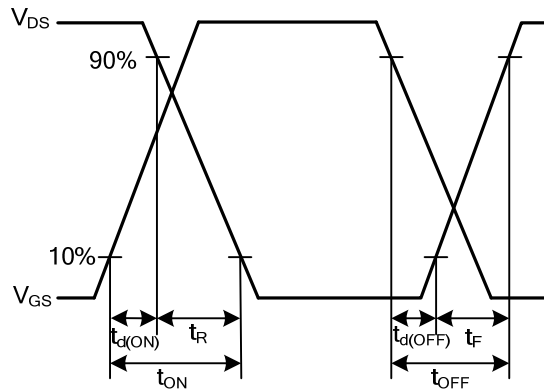
Gate Charge Test Circuit



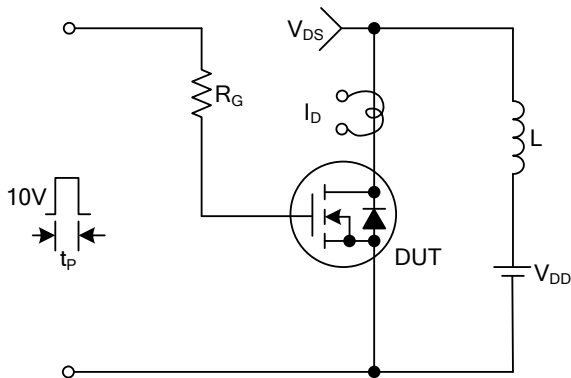
Gate Charge Waveforms



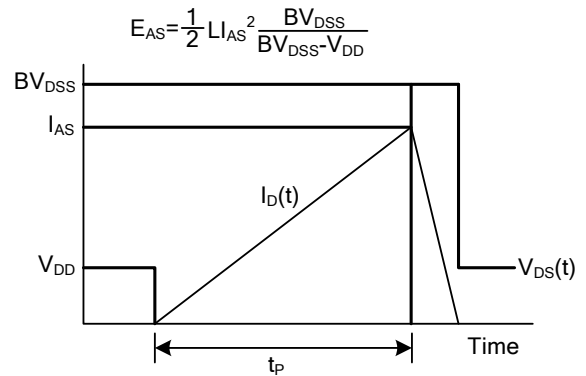
Resistive Switching Test Circuit



Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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