

Power MOSFET

5A, 500V N-CHANNEL POWER MOSFET

DESCRIPTION

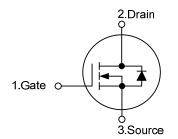
The UTC **5N50K-MT** is an N-channel power MOSFET adopting UTC's advanced technology to provide customers with DMOS, planar stripe technology. This technology is designed to meet the requirements of the minimum on-state resistance and perfect switching performance. It also can withstand high energy pulse in the avalanche and communication mode.

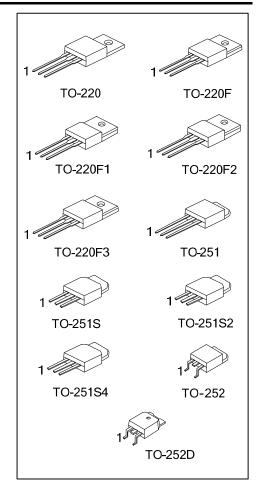
The UTC **5N50K-MT** can be used in applications, such as active power factor correction, high efficiency switched mode power supplies, electronic lamp ballasts based on half bridge topology.

FEATURES

- * $R_{DS(ON)}$ < 1.4 Ω @ V_{GS} =10V, I_D =2.5A
- * 100% avalanche tested
- * High switching speed

SYMBOL



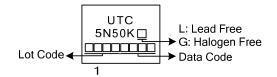


ORDERING INFORMATION

Ordering Number		Dookogo	Pin Assignment			Decking	
Lead Free	Halogen Free	Package	1	2	3	Packing	
5N50KL-TA3-T	5N50KG-TA3-T	5N50KG-TA3-T TO-220 G D S		S	Tube		
5N50KL-TF3-T	5N50KG-TF3-T	TO-220F	G	D	S	Tube	
5N50KL-TF1-T	5N50KG-TF1-T	TO-220F1	G	D	S	Tube	
5N50KL-TF2-T	5N50KG-TF2-T	TO-220F2	G	D	S	Tube	
5N50KL-TF3-T	5N50KG-TF3-T	TO-220F3	G	D	S	Tube	
5N50KL-TM3-T	5N50KG-TM3-T	TO-251	G	D	S	Tube	
5N50KL-TMS-T	5N50KG-TMS-T	TO-251S	G	D	S	Tube	
5N50KL-TMS2-T	5N50KG-TMS2-T	TO-251S2	G	D	S	Tube	
5N50KL-TMS4-T	5N50KG-TMS4-T	TO-251S4	G	D	S	Tube	
5N50KL-TN3-R	5N50KG-TN3-R	TO-252	G	D	S	Tape Reel	
5N50KL-TND-R	5N50KG-TND-R	TO-252D	G	D	S	Tape Reel	
Note: Pin Assignment: G: Ga	te D: Drain S: Source						
		1) T. Tube R. Ta	no Rool				

5N50KL-TA3-T	(1) T: Tube, R: Tape Reel
(1)Packing Type	(2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1,
	TF2: TO-220F2, TF3: TO-220F3, TM3: TO-251
(2)Package Type	TMS: TO-251S, TMS2: TO-251S2,
(3)Green Package	TMS4: TO-251S4, TN3: TO-252, TND: TO-252D
	(3) L: Lead Free, G: Halogen Free and Lead Free

MARKING



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

PAR	AMETER	SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V _{DSS}	500	V
Gate-Source Voltage		V _{GSS}	±30	V
Drain Current	Continuous	I _D	5	А
Drain Current	Pulsed (Note 2)	I _{DM}	20	А
Avalanche Current (N	ote 2)	I _{AR}	5	А
Avalanaha Enargy	Single Pulsed (Note 3)	E _{AS}	150	mJ
Avalanche Energy	Repetitive (Note 2)	E _{AR}	500 ±30 5 20 5 150 7.3 4.5 78 36 29 54 +150	mJ
Peak Diode Recovery	dv/dt (Note 4)	dv/dt	4.5	V/ns
	TO-220		78	W
	$\begin{tabular}{ c c c c c } \hline U & V_{DSS} & V_{DSS} \\ \hline U & V_{CSS} & V_{CSS} \\ \hline Pulsed (Note 2) & I_{DM} \\ \hline Pulsed (Note 2) & I_{AR} \\ \hline Pulsed (Note 2) & I_{AR} \\ \hline Single Pulsed (Note 3) & E_{AS} \\ \hline Repetitive (Note 2) & E_{AR} \\ \hline Repetitive (Note 2) & V/dt \\ \hline D & V/dt \\ \hline D & V/dt (Note 4) & V/dt \\ \hline TO & 220F/TO & 220F1 \\ \hline TO & 220F3 & TO & P_D \\ \hline TO & 251/TO & 251S1 \\ \hline TO & 252/TO & 251S4 \\ \hline TO & 252/TO & 252D & T_J \\ \hline \hline Temperature & T_J \\ \hline \end{tabular}$		36	W
Power Dissipation		PD	29	W
	TO-251/TO-251S			
	TO-251S2/TO-251S4		54	W
	TO-252/TO-252D			
Junction Temperature		TJ	+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 = 12mH, I_{AS} = 5A, V_{DD} = 50V, R_G = 25 Ω , Starting T_J = 25°C
- 4. I_{SD} ≤5A, di/dt ≤ 200A/µs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F TO-220F1/TO-220F2 TO-220F3	0	62.5	°C/W
	TO-251/TO-251S TO-251S2/TO-251S4 TO-252/TO-252D	θ _{JA}	110	°C/W
Junction to Case	TO-220		1.16	°C/W
	TO-220F/TO-220F1 TO-220F3		4.2	°C/W
	TO-220F2	θ」	4.18	°C/W
	TO-251/TO-251S TO-251S2/TO-251S4 TO-252/TO-252D		2.3	°C/W



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

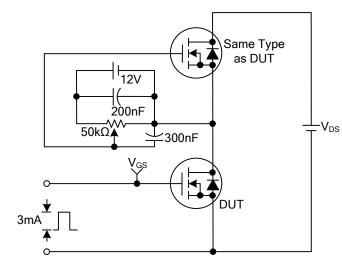
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V				V
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS} / \triangle T_J$	Reference to 25°C, I _D =250µA		0.5		V/°C
Drain-Source Leakage Current		I _{DSS}	V _{DS} =500V, V _{GS} =0V			1	
			V _{DS} =400V, T _C =125°C			10	μA
	Forward	Forward	V _{GS} =30V, V _{DS} =0V			100	nA
Gate- Source Leakage Current	Reverse	I _{GSS}	V_{GS} =-30V, 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
Static Drain-Source On-State Re	esistance	R _{DS(ON)}	V _{GS} =10V, I _D =2.5A		1.23	1.4	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}			525	625	pF
Output Capacitance		C _{OSS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		64	105	pF
Reverse Transfer Capacitance		C _{RSS}			6	20	рF
SWITCHING PARAMETERS							
Turn-ON Delay Time		t _{D(ON)}			46	60	ns
Rise Time		t _R	V _{DD} =30V, I _D =0.5A,		50	70	ns
Turn-OFF Delay Time		t _{D(OFF)}	R _G =25Ω (Note 1, 2)		54	130	ns
Fall-Time					44	105	ns
Total Gate Charge		Q_G			21.6	24	nC
Gate to Source Charge		Q _{GS}	V_{GS} =10V, V_{DS} =50V,		5.6		nC
Gate to Drain Charge		Q_{GD}	I _D =1.3A (Note 1, 2)		5.5		nC
SOURCE- DRAIN DIODE RATI	NGS AND C	HARACTERIS	TICS				
Maximum Continuous Drain-Source Diode		Is				-	•
Forward Current						5	A
Maximum Pulsed Drain-Source Diode		1				20	^
Forward Current		I _{SM}				20	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =5A, V _{GS} =0V			1.4	V
Reverse Recovery Time		t _{rr}	I _S =5A, V _{GS} =0V, 263		263		ns
Reverse Recovery Charge		Q _{RR}	dl _F /dt=100A/µs (Note 1)		1.9		μC

Notes: 1. Pulse Test: Pulse width \leq 300µs, Duty cycle \leq 2%

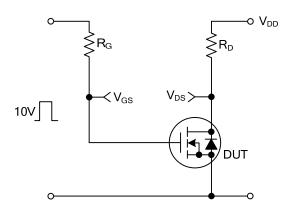
2. Essentially independent of operating temperature.



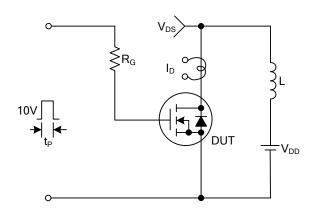
TEST CIRCUITS AND WAVEFORMS



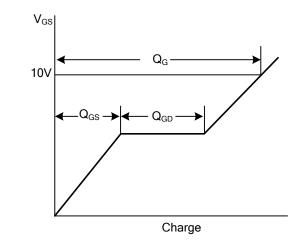
Gate Charge Test Circuit



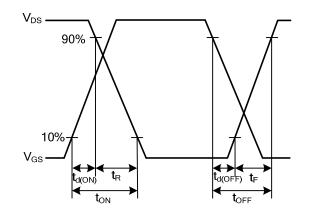
Resistive Switching Test Circuit



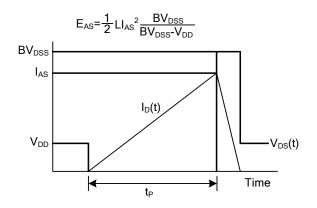
Unclamped Inductive Switching Test Circuit



Gate Charge Waveforms



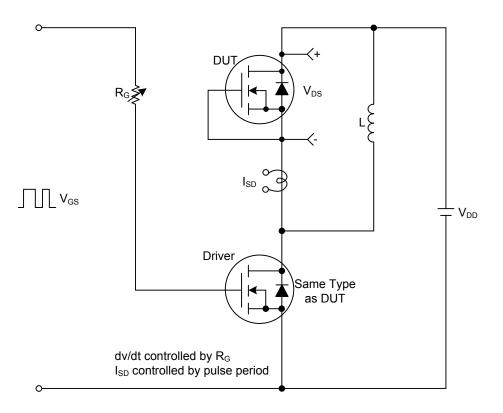
Resistive Switching Waveforms



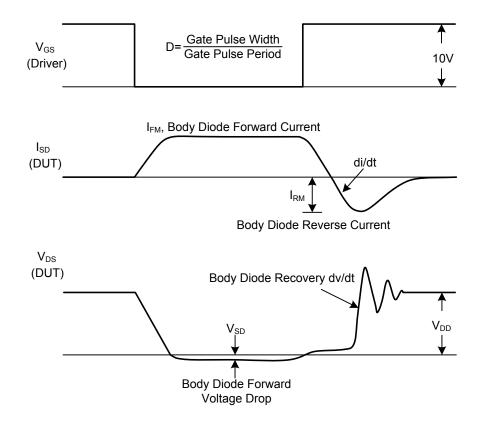
Unclamped Inductive Switching Waveforms



■ TEST CIRCUITS AND WAVEFORMS(Cont.)



Peak Diode Recovery dv/dt Test Circuit & Waveforms

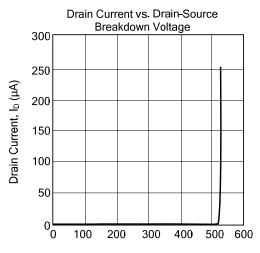




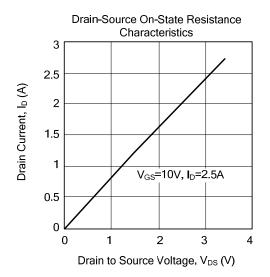
Power MOSFET

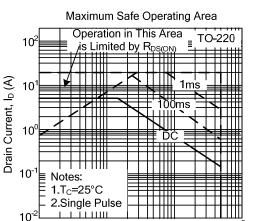
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TYPICAL CHARACTERISTICS



Drain-Source Breakdown Voltage, BV_{DSS}(V)





 10^{1}

 10^{0}

Drain Current, I_D (µA) 150 100 50 0^L 0 1 2 3 4 Gate Threshold Voltage, V_{TH} (V)

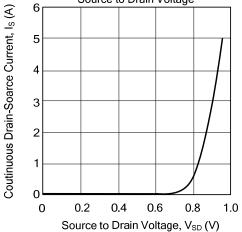
300

250

200

Coutinuous Drain-Soarce Current vs. Source to Drain Voltage

Drain Current vs. Gate Threshold Voltage



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Drain Source Voltage, V_{DS} (V)

 10^{2}

10

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