



12N50K-MT

Power MOSFET

12A, 500V N-CHANNEL POWER MOSFET

DESCRIPTION

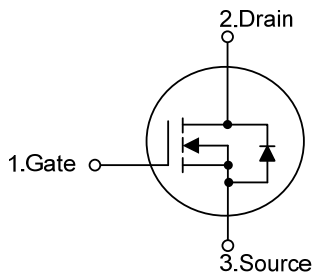
The UTC **12N50K-MT** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **12N50K-MT** is generally applied in high efficiency switch mode power supplies, active power factor correction and electronic lamp ballasts based on half bridge topology.

FEATURES

- * $R_{DS(ON)} < 0.52 \Omega @ V_{GS} = 10 V, I_D = 6 A$
- * High Switching Speed
- * 100% Avalanche Tested

SYMBOL

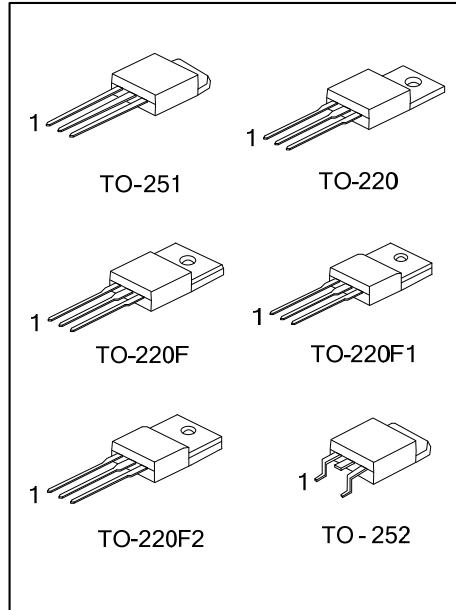


ORDERING INFORMATION

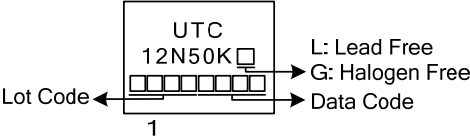
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12N50KL-TA3-T	12N50KG-TA3-T	TO-220	G	D	S	Tube
12N50KL-TF1-T	12N50KG-TF1-T	TO-220F1	G	D	S	Tube
12N50KL-TF2-T	12N50KG-TF2-T	TO-220F2	G	D	S	Tube
12N50KL-TF3-T	12N50KG-TF3-T	TO-220F	G	D	S	Tube
12N50KL-TM3-T	12N50KG-TM3-T	TO-251	G	D	S	Tube
12N50KL-TN3-R	12N50KG-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>12N50KL-TA3-T</p> <p>(1)Packing Type (2)Package Type (3)Green Package</p>	<p>(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2, TM3: TO-251, TN3: TO-252 (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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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 ($T_C=25^\circ\text{C}$)	I_D	12 (Note 2)	A
	Pulsed (Note 3)	I_{DM}	48 (Note 2)	A
Avalanche Current (Note 3)		I_{AR}	12	A
Avalanche Energy	Single Pulsed (Note 4)	E_{AS}	600	mJ
Peak Diode Recovery dv/dt (Note 5)		dv/dt	3.5	V/ns
Power Dissipation	TO-220	P_D	200	W
	TO-220F		50	W
	TO-220F1/TO-220F2		54	W
	TO-251/TO-252		45	W
Derate above 25°C	TO-220		1.6	$\text{W}/^\circ\text{C}$
	TO-220F		0.4	$\text{W}/^\circ\text{C}$
	TO-220F1/TO-220F2		0.43	$\text{W}/^\circ\text{C}$
	TO-251/TO-252		0.36	$\text{W}/^\circ\text{C}$
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. Drain current limited by maximum junction temperature
 3. Repetitive Rating: Pulse width limited by maximum junction temperature
 4. $L = 8.33\text{mH}$, $I_{AS} = 12\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
 5. $I_{SD} \leq 12\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2			
	TO-251/TO-252			
Junction to Case	TO-220	θ_{JC}	0.625	$^\circ\text{C}/\text{W}$
	TO-220F		2.5	$^\circ\text{C}/\text{W}$
	TO-220F1/TO-220F2		2.31	$^\circ\text{C}/\text{W}$
	TO-251/TO-252		2.77	$^\circ\text{C}/\text{W}$

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

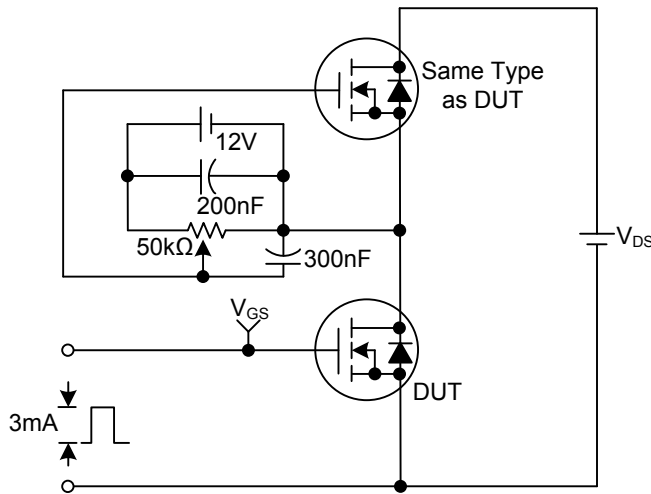
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	500			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =500V, V _{GS} =0V			10	μA
Gate- Source Leakage Current	Forward	V _{GS} =+30V, V _{DS} =0V			+100	nA
	Reverse	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 Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =6A		0.39	0.52	Ω
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		850	1500	pF
Output Capacitance	C _{OSS}			160	210	pF
Reverse Transfer Capacitance	C _{RSS}			10	22	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{GS} =10V, V _{DS} =50V, I _D =1.3A (Note 1, 2)		36	45	nC
Gate to Source Charge	Q _{GS}			10		nC
Gate to Drain Charge	Q _{GD}			10		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} =30V, I _D =0.5A, R _G =25Ω (Note 1, 2)		75	90	ns
Rise Time	t _R			125	150	ns
Turn-OFF Delay Time	t _{D(OFF)}			190	210	ns
Fall-Time	t _F			125	150	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I _S				12	A
Maximum Body-Diode Pulsed Current	I _{SM}				48	A
Drain-Source Diode Forward Voltage	V _{SD}	I _S =12A, V _{GS} =0V			1.5	V
Reverse Recovery Time	t _{rr}	I _S =12A, V _{GS} =0V		400		ns
Reverse Recovery Charge	Q _{RR}	di/dt=100A/μs (Note 1)		4.3		μC

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

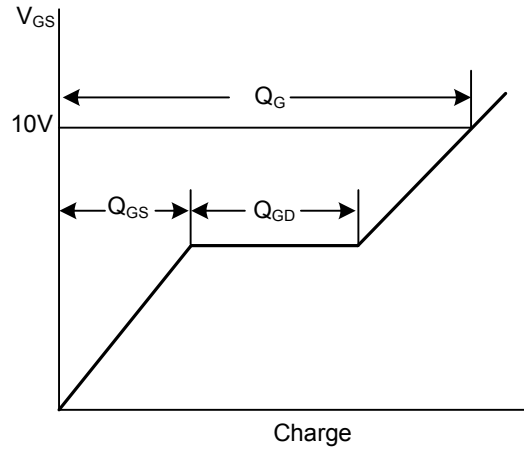
2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

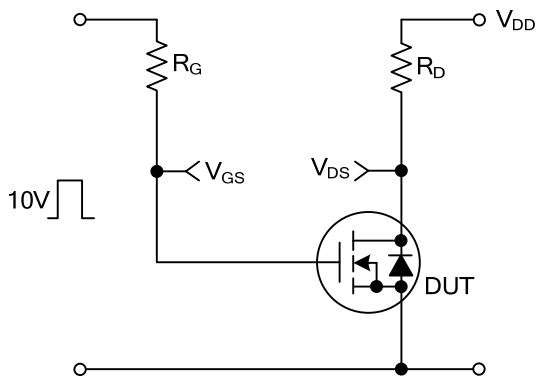
Gate Charge Test Circuit



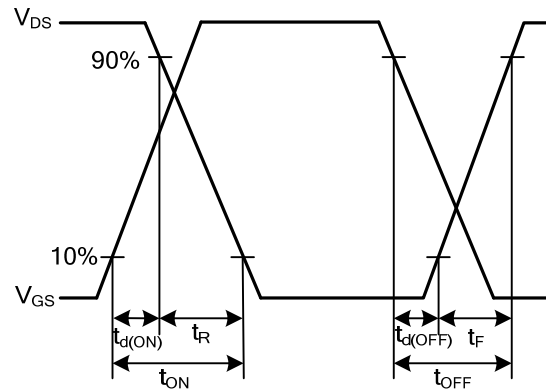
Gate Charge Waveforms



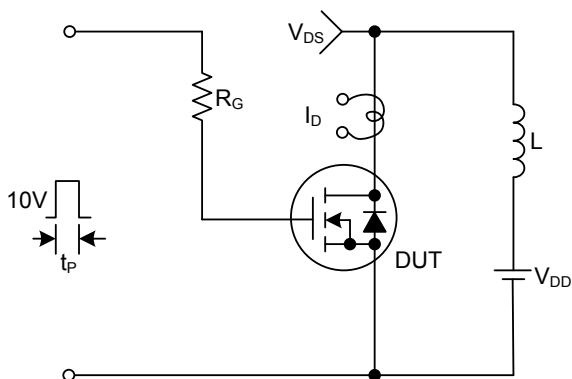
Resistive Switching Test Circuit



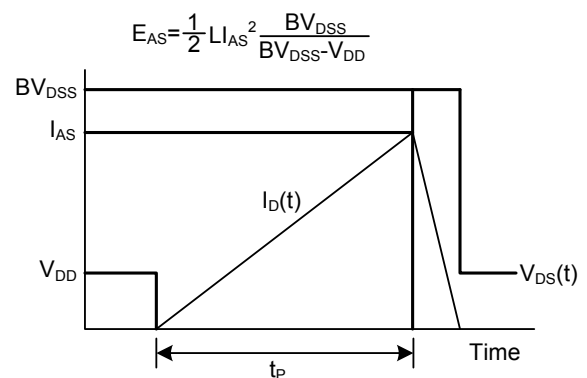
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

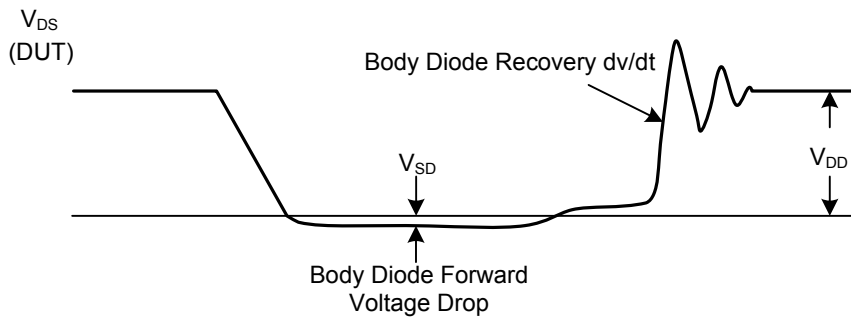
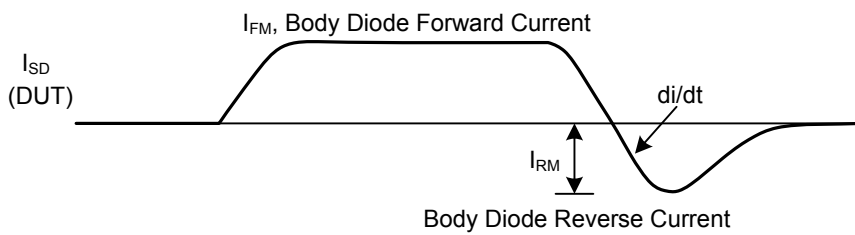
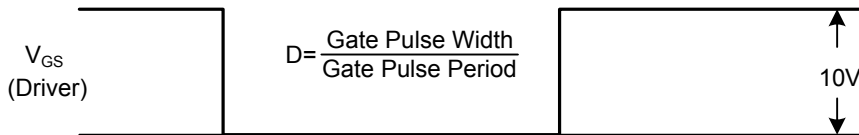
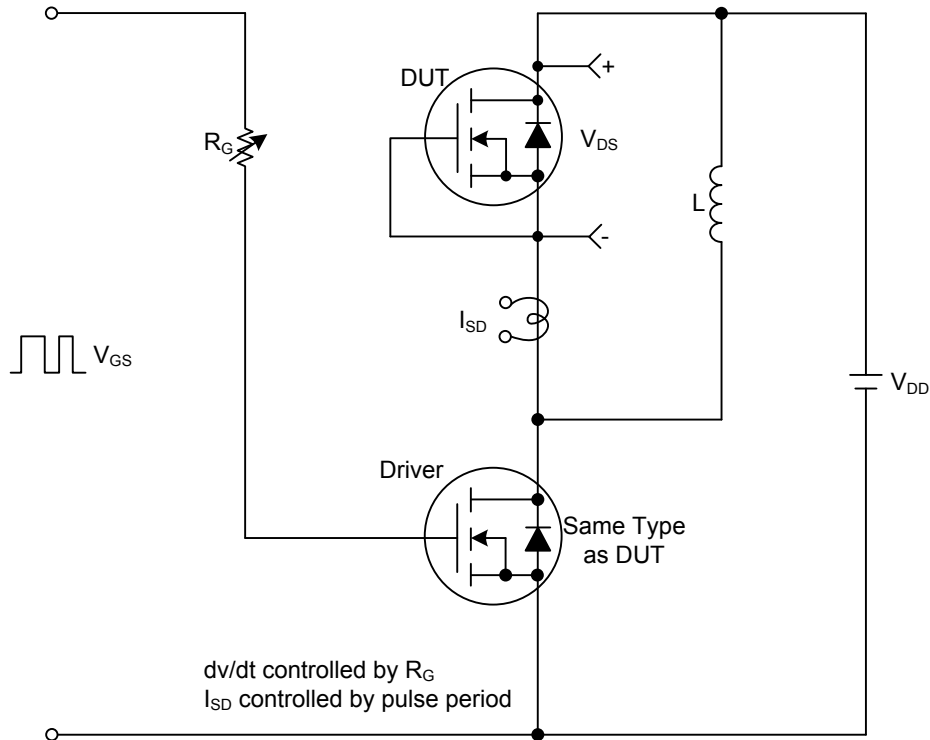


Unclamped Inductive Switching Waveforms

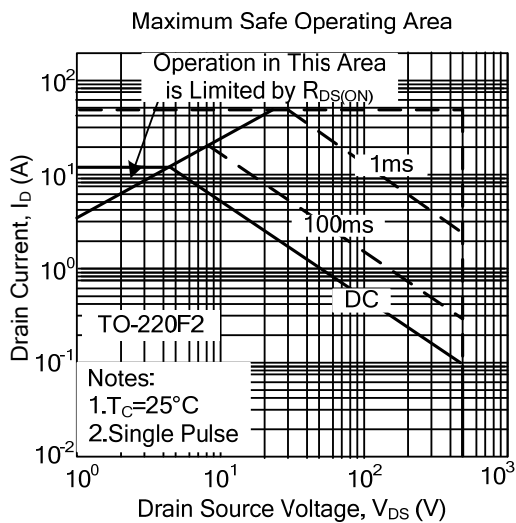
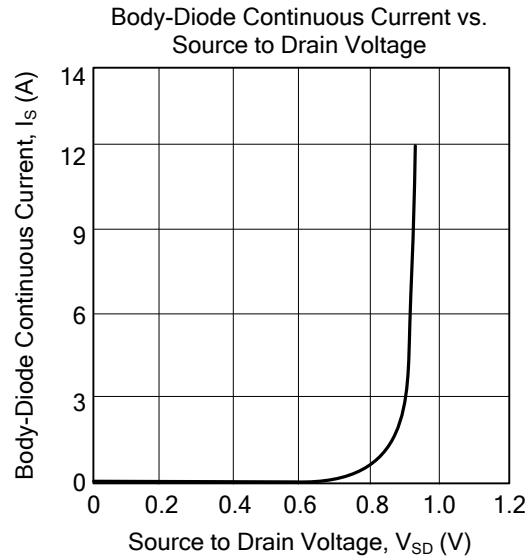
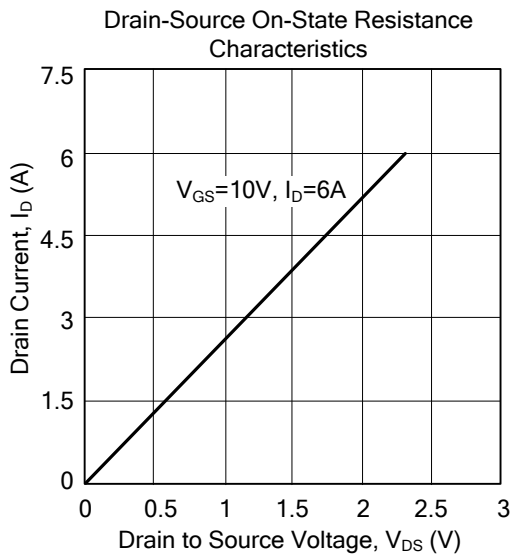
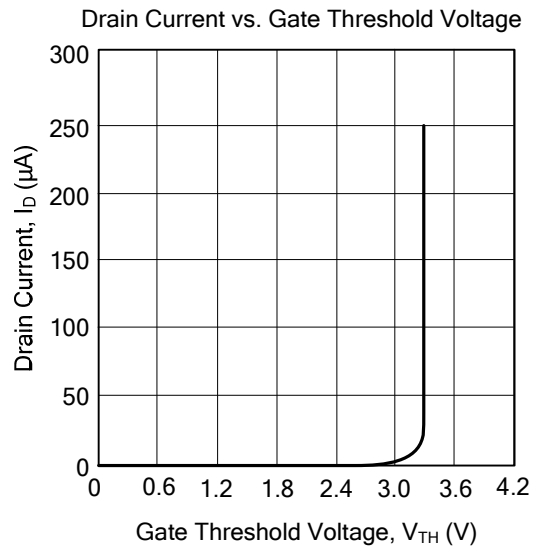
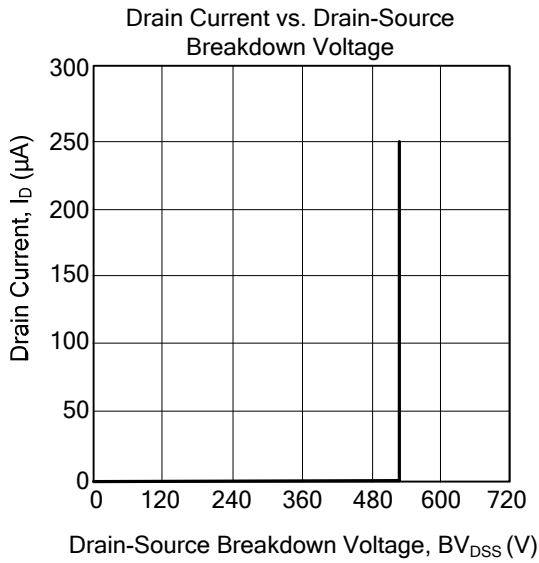


■ TEST CIRCUITS AND WAVEFORMS(Cont.)

Peak Diode Recovery dv/dt Test Circuit & Waveforms



TYPICAL CHARACTERISTICS



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