



6NM50

Power MOSFET

6A, 500V N-CHANNEL SUPER-JUNCTION MOSFET

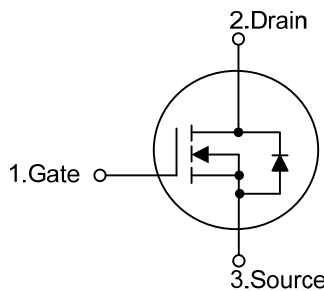
■ DESCRIPTION

The **UTC 6NM50** is a Super Junction MOSFET Structure and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and a high rugged avalanche characteristics. This power MOSFET is usually used at AC-DC converters for power applications.

■ FEATURES

- * $R_{DS(on)} \leq 0.9 \Omega @ V_{GS}=10V, I_D=3.0A$
- * Improved dv/dt capability
- * Fast switching
- * 100% avalanche tested

■ SYMBOL

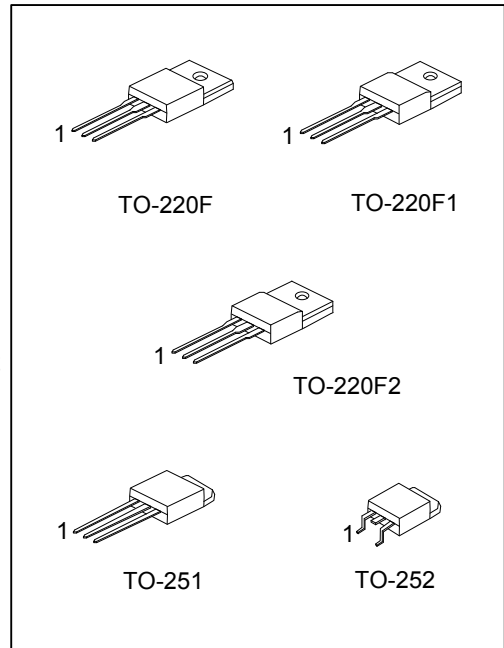


■ ORDERING INFORMATION

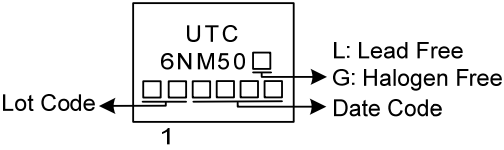
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6NM50L-TF1-T	6NM50G-TF1-T	TO-220F1	G	D	S	Tube
6NM50L-TF2-T	6NM50G-TF2-T	TO-220F2	G	D	S	Tube
6NM50L-TF3-T	6NM50G-TF3-T	TO-220F	G	D	S	Tube
6NM50L-TM3-T	6NM50G-TM3-T	TO-251	G	D	S	Tube
6NM50L-TN3-R	6NM50G-TN3-R	TO-252	G	D	S	Tape Reel

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

<p>6NM50G-TF1-T</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Green Package</p>	<p>(1) T: Tube, R: Tape Reel</p> <p>(2) TF3: TO-220F, TF1: TO-220F1, TF2: TO-220F2</p> <p>TM3: TO-251, TN3: TO-252</p> <p>(3) G: Halogen Free and Lead Free, L: 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 ($T_C=25^\circ\text{C}$)	Continuous	I_D	6.0	A
	Pulsed (Note 2)	I_{DM}	24	A
Avalanche Current (Note 2)		I_{AR}	2.6	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	155	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.4	V/ns
Power Dissipation	TO-220F/TO-220F1	P_D	20	W
	TO-220F2			
	TO-251/TO-252		21	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. $L=46\text{mH}$, $I_{AS}=2.6\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD}\leq 6.0\text{A}$, $di/dt\leq 200\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220F/TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-220F2			
	TO-251/TO-252		110	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220F/TO-220F1	θ_{JC}	6.25	$^\circ\text{C}/\text{W}$
	TO-220F2			
	TO-251/TO-252		5.95 (Note)	$^\circ\text{C}/\text{W}$

Note: Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper plate.

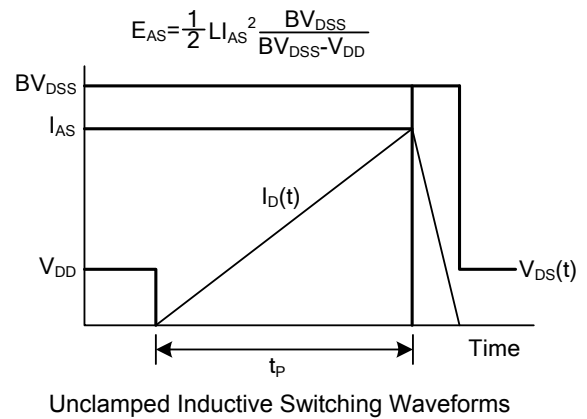
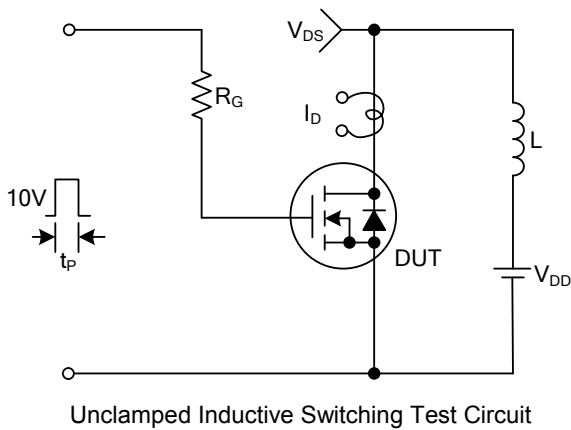
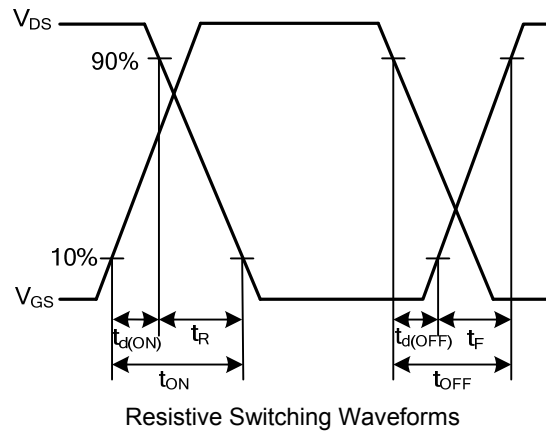
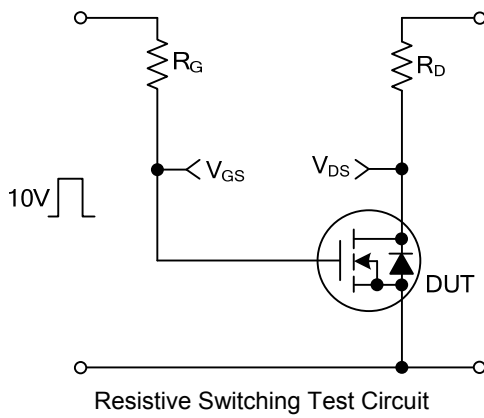
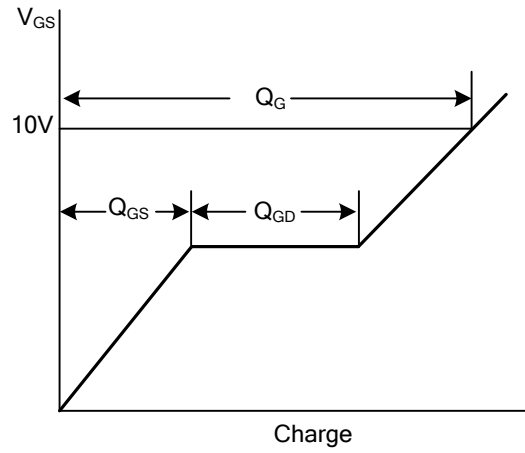
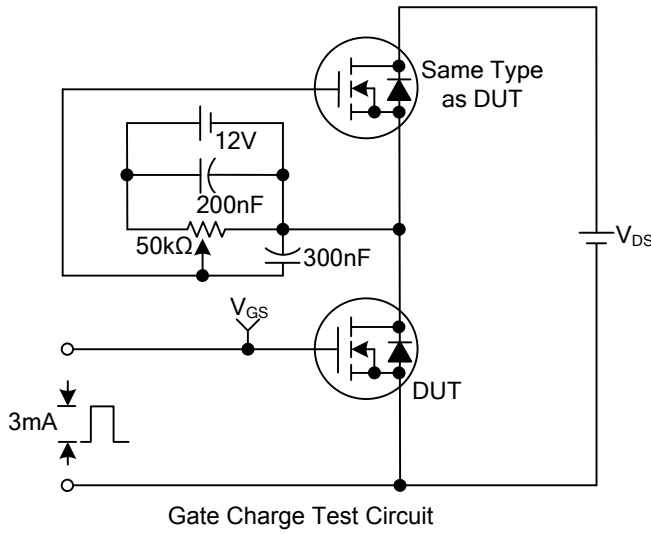
■ ELECTRICAL CHARACTERISTICS ($T_J=25^\circ\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	500			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=500V, V_{GS}=0V$			10	μA
Gate-Source Leakage Current	Forward	I_{GSS}			100	nA
	Reverse				-100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5		4.5	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=3.0A$			0.9	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	$V_{DS}=25V, V_{GS}=0V, f=1.0MHz$		295		pF
Output Capacitance	C_{OSS}			200		pF
Reverse Transfer Capacitance	C_{RSS}			40		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=50V, V_{GS}=10V, I_D=1.3A, I_G=100\mu A$ (Note 1, 2)		37		nC
Gate to Source Charge	Q_{GS}			3		nC
Gate to Drain Charge	Q_{GD}			10		nC
Turn-ON Delay Time (Note 1)	$t_{D(ON)}$	$V_{DD}=30V, V_{GS}=10V, I_D=0.5A, R_G=25\Omega$ (Note 1, 2)		35		nS
Rise Time	t_R			68		nS
Turn-OFF Delay Time	$t_{D(OFF)}$			130		nS
Fall-Time	t_F			70		nS
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Body-Diode Continuous Current	I_S				6	A
Maximum Body-Diode Pulsed Current	I_{SM}				24	A
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$V_{GS}=0V, I_S=6.0A$			1.4	V
Body Diode Reverse Recovery Time (Note 1)	t_{rr}	$V_{GS}=0V, I_S=6.0A,$		285		nS
Body Diode Reverse Recovery Charge	Q_{rr}	$dI_F/dt=100A/\mu s$ (Note1)		2.3		μC

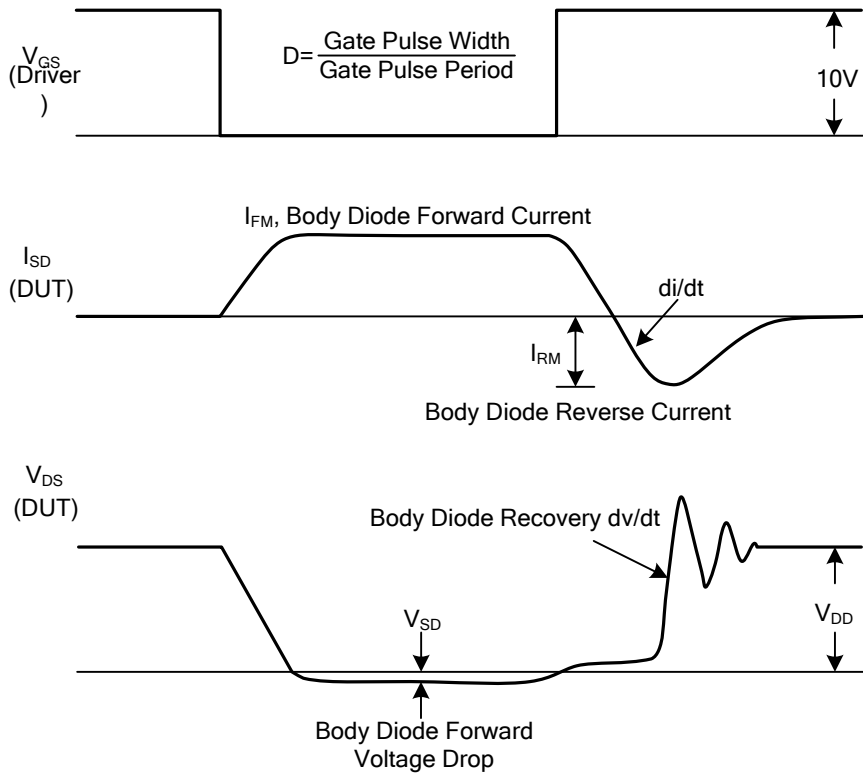
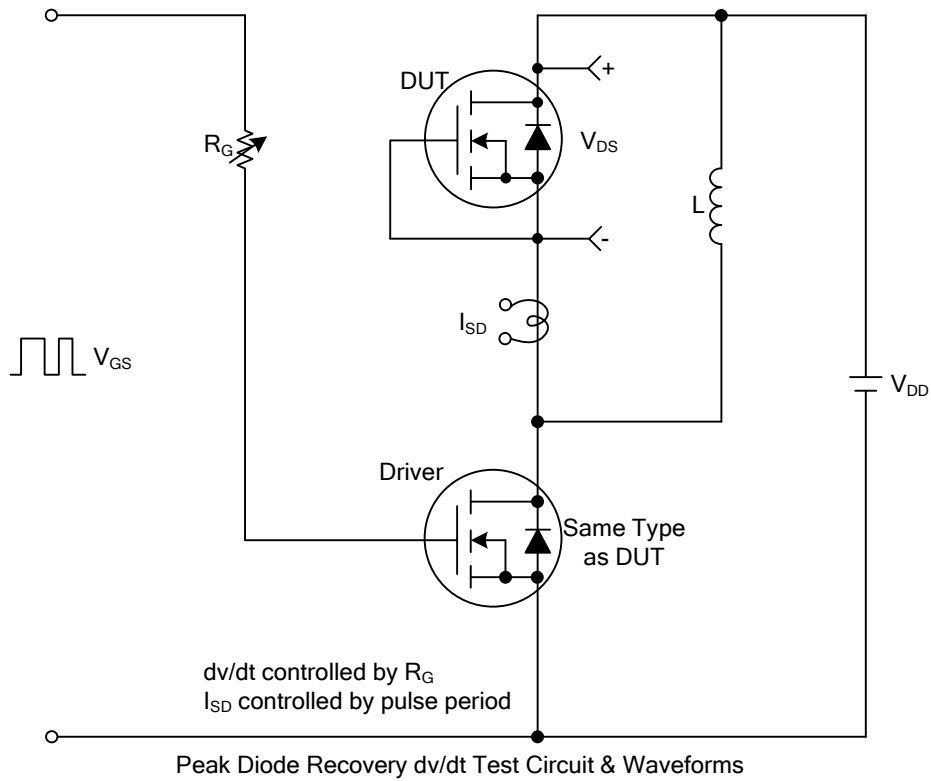
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating ambient temperature.

TEST CIRCUITS AND WAVEFORMS



■ TEST CIRCUITS AND WAVEFORMS(Cont.)



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