



08NM50

Preliminary

Power MOSFET

0.8A, 500V N-CHANNEL SUPER-JUNCTION MOSFET

DESCRIPTION

The UTC **08NM50** 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 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 DC to DC converters and bridge circuits.

FEATURES

* $R_{DS(on)} < 9.0 \Omega$ @ $V_{GS}=10V$, $I_D=0.4A$

* High breakdown voltage

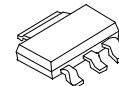
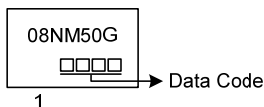
ORDERING INFORMATION

Ordering Number	Package	Pin Assignment			Packing
		1	2	3	
08NM50G-AA3-R	SOT-223	G	D	S	Tape Reel

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

08NM50G-AA3-R	(1)Packing Type (2)Package Type (3)Green Package	(1) R: Tape Reel (2) AA3: SOT-223 (3) G: Halogen Free and Lead Free
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MARKING



1

SOT-223

■ 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	0.8	A
	Pulsed (Note 2)	I_{DM}	3.2	A
Avalanche Current (Note 2)		I_{AR}	0.6	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	26	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.19	V/ns
Power Dissipation		P_D	1	W
Junction Temperature		T_J	150	$^\circ\text{C}$
Storage Temperature Range		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. $L = 144\text{mH}$, $I_{AS} = 0.6\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$

4. $I_{SD} \leq 1.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	150	$^\circ\text{C}/\text{W}$
Junction to Case	θ_{JC}	125	$^\circ\text{C}/\text{W}$

■ 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 =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	I _{GSS}	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	2.5		4.5	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =0.4A			9.0	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		38		pF
Output Capacitance		C _{OSS}			35		pF
Reverse Transfer Capacitance		C _{RSS}			8		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =30V, V _{GS} =10V, I _D =0.5A, I _D =100μA (Note 1, 2)		8		nC
Gate to Source Charge		Q _{GS}			1.2		nC
Gate to Drain Charge		Q _{GD}			1.4		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DS} =30V, V _{GS} =10V, I _D =0.8A, R _G =25Ω (Note 1, 2)		37		ns
Rise Time		t _R			24		ns
Turn-OFF Delay Time		t _{D(OFF)}			39		ns
Fall-Time		t _F			21		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				0.8	A
Maximum Body-Diode Pulsed Current		I _{SM}				32	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =0.8A, V _{GS} =0V			1.4	V
Reverse Recovery Time (Note 1)		t _{rr}	I _S =0.8A, V _{GS} =0V		180		ns
Reverse Recovery Charge		Q _{rr}	di/dt=100A/μs		0.41		μC

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

2. Essentially independent of operating temperature.

D.U.T.

V_{DS}

I_{SD}

L

V_{DD}

R_G

Driver

V_{GS}

Same Type as D.U.T.

- * dv/dt controlled by R_G
- * I_{SD} controlled by pulse period
- * D.U.T.-Device Under Test

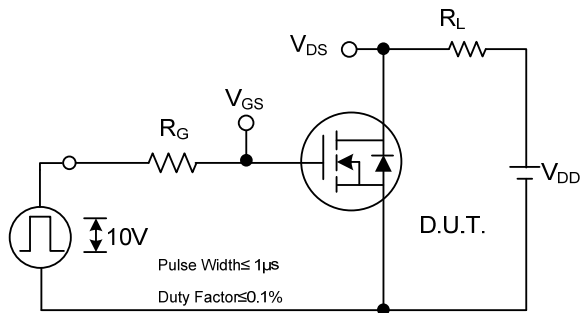
Timing diagram for a MOSFET switching a load inductor. The diagram shows three waveforms: V_{GS} (Driver), I_{SD} (D.U.T.), and V_{DS} (D.U.T.).

- V_{GS} (Driver): A square wave with pulse width (P.W.) and period. The duty cycle is defined as $D = \frac{P.W.}{Period}$. The peak voltage is $V_{GS} = 10V$.
- I_{SD} (D.U.T.): The drain current. It shows the inductor current I_{FM} (Body Diode Forward Current) during the on-state and the reverse current I_{RM} (Body Diode Reverse Current) during the off-state. The slope of the reverse current is labeled di/dt .
- V_{DS} (D.U.T.): The drain-source voltage. It shows the body diode forward voltage drop and the body diode recovery dv/dt during the off-state. The peak voltage is V_{DD} .

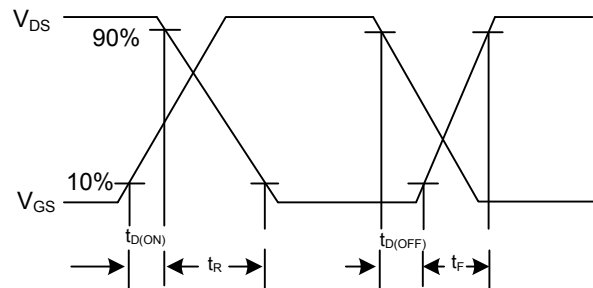
The load inductor is represented by a dashed rectangle.

Peak Diode Recovery dv/dt Waveforms

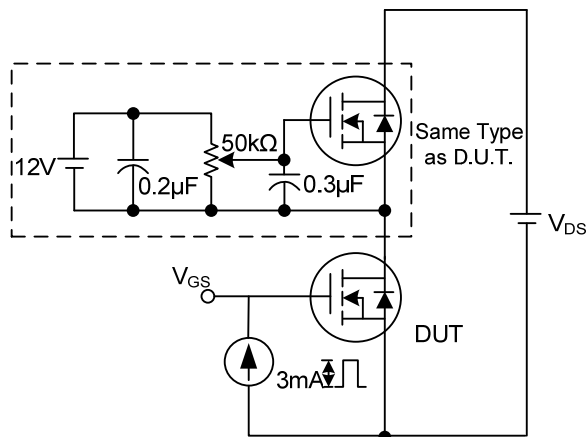
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



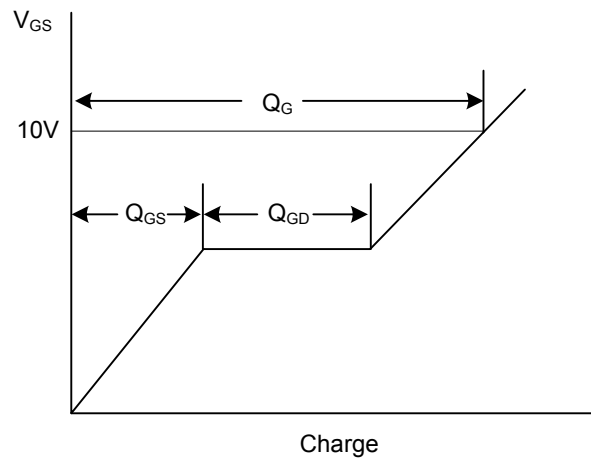
Switching Test Circuit



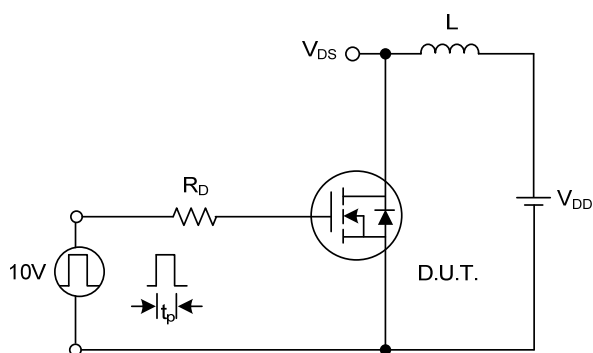
Switching Waveforms



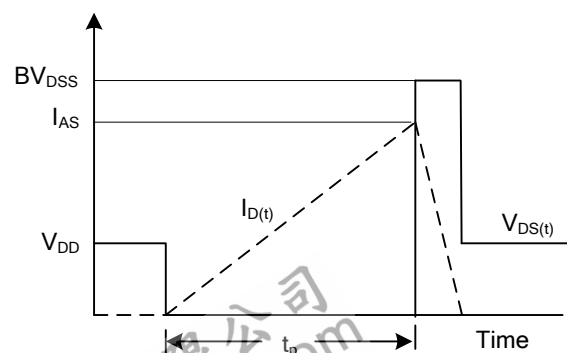
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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