7A, 500V N-CHANNEL POWER MOSFET

DESCRIPTION

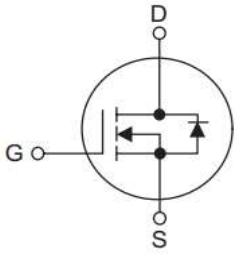
The 7N50 is an N-channel mode power MOSFET using and advanced technology to provide customers with planar stripe. The technology reduce the conduction loss, improve switching performance and enhance the avalanche energy.

This power MOSFET is generally applied in high efficiency switch mode power supplies, active power factor correction and electronic lamp ballasts based on half bridge opology.

FEATURES

* $R_{DS(ON)}$ < 1.0Ω @ V_{GS}=10V, I_D=3.5A
* Fast Switching Capability
* 100% avalanche tested

SYMBOL



1. Gate
2. Drain
3. Source

Package Description

Product Model	Package Type	Mark Name	Indentification Code	Package
CMN7N50F	TO-220F	CMN7N50	F	Tube

CMN7N50 F

(2) Package type

(1) Chip name

(1) CMN7N50: 500V 7A (2) F:TO-220F

ABSOLUTE MAXIMUM RATINGS (T_C = 25°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°C)		I_D	7	A
	Pulsed (Note 2)		I_{DM}	28	A
Avalanche Current (Note 3)			I_{AR}	5.5	A
Avalanche Energy	Single Pulsed (Note 3)		E_{AS}	151	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	3.7	V/ns
Power Dissipation	T_C=25°C	TO-220F	PD	48	W
Junction Temperature			T_J	+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 = 10mH, I_{AS} =5.5A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
4. I_{SD} ≤ 7.0A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

THERMAL CHARACTERISTICS

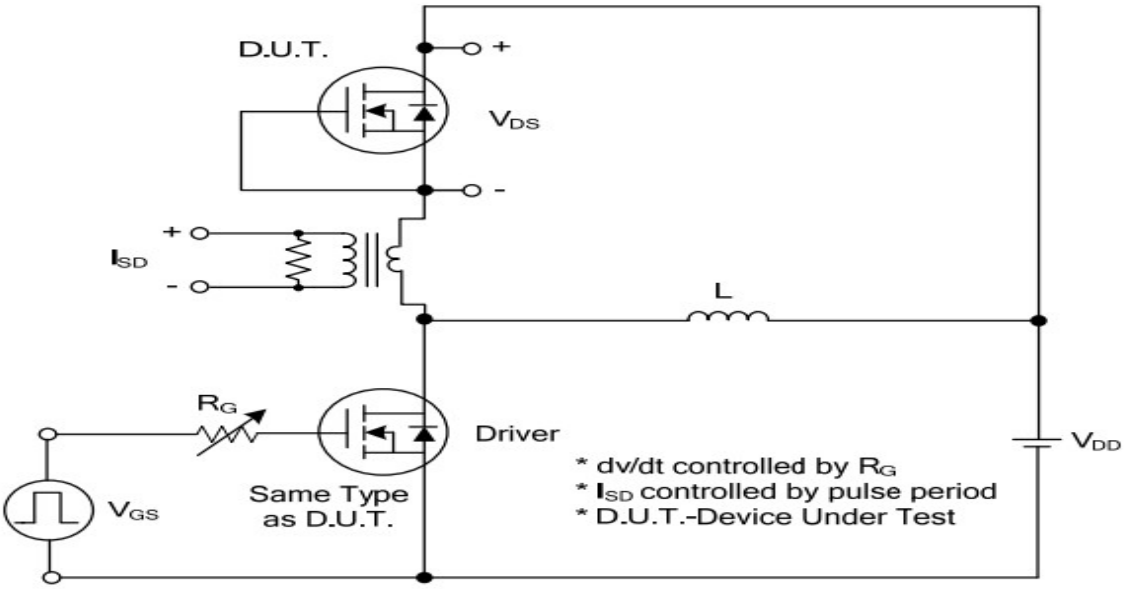
Symbol	Parameter	PACKAGE	RATINGS	Units
$R_{\theta JC}$	Junction-to-Case	TO-220F	2.6	℃/W
$R_{\theta JA}$	Junction-to-Ambient	TO-220F	62.5	℃/W

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

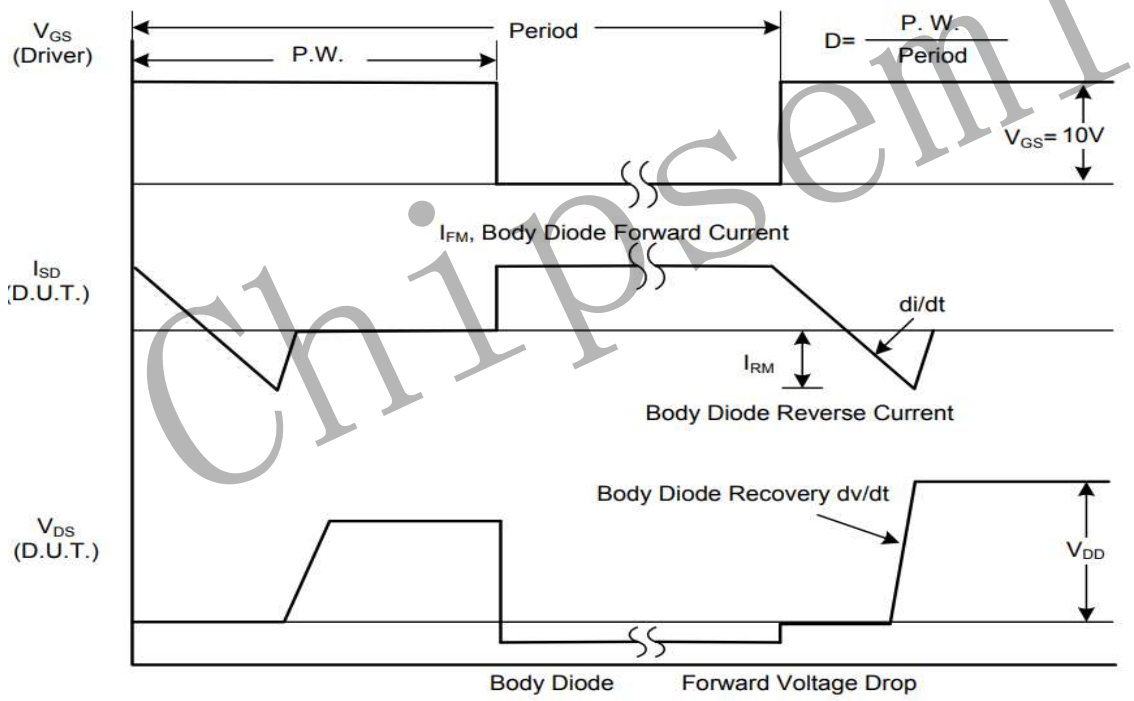
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	I_D=250μA, V_{GS}=0V	500			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=500V, V_{GS}=0V			1	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=+30V, V_{DS}=0V			+100	nA
	Reverse		V_{GS}=-30V, V_{DS}=0V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=3.5A		0.8	0.9	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C_{ISS}	V_{GS}=0V, V_{DS}=25V, f=1.0MHz		1000		pF
Output Capacitance		C_{OSS}			95		pF
Reverse Transfer Capacitance		C_{RSS}			75		pF
SWITCHING PARAMETERS							
Total Gate Charge		Q_G	V_{GS}=10V, V_{DS}=50V, I_D=1.3A I_G=100μA (Note 1, 2)		65		nC
Gate to Source Charge		Q_{GS}			5.8		nC
Gate to Drain Charge		Q_{GD}			6.0		nC
Turn-ON Delay Time		$t_{D(ON)}$	V_{DD}=30V, V_{GS}=10V, I_D=0.5A, R_G=25Ω (Note 1, 2)		53		ns
Rise Time		t_R			36		ns
Turn-OFF Delay Time		$t_{D(OFF)}$			160		ns
Fall-Time		t_F			38		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I_S				7	A
Maximum Body-Diode Pulsed Current		I_{SM}				28	A
Drain-Source Diode Forward Voltage		V_{SD}	I_S=7A, V_{GS}=0V			1.4	V
Body Diode Reverse Recovery Time		t_{rr}	I_S=7A, V_{GS}=0V, dI_F/dt=100A/μs (Note 1)		245		ns
Body Diode Reverse Recovery Charge		Q_{RR}			1.45		μC

Notes:
1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%.
2. Essentially independent of operating temperature.

TEST CIRCUITS AND WAVEFORMS

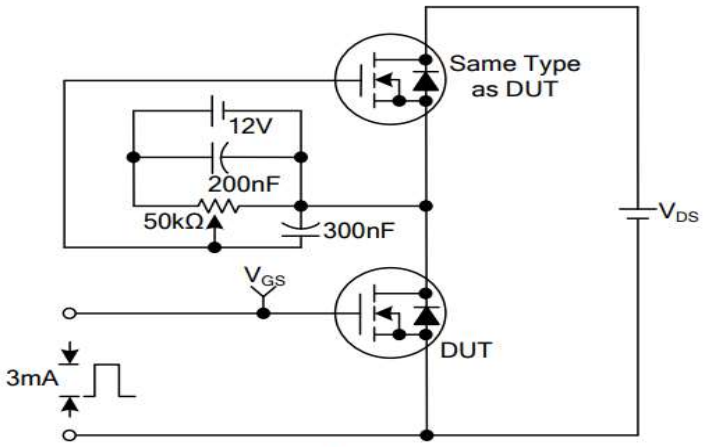


Peak Diode Recovery dv/dt Test Circuit

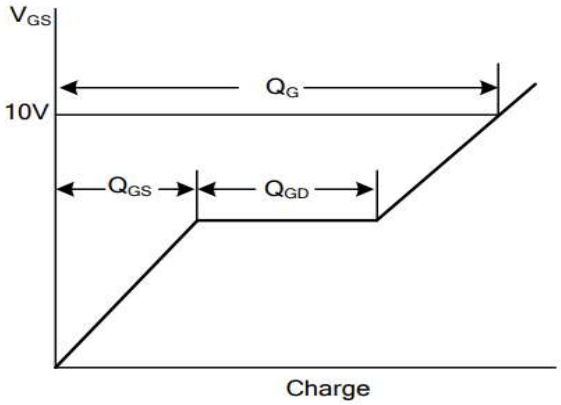


Peak Diode Recovery dv/dt Waveforms

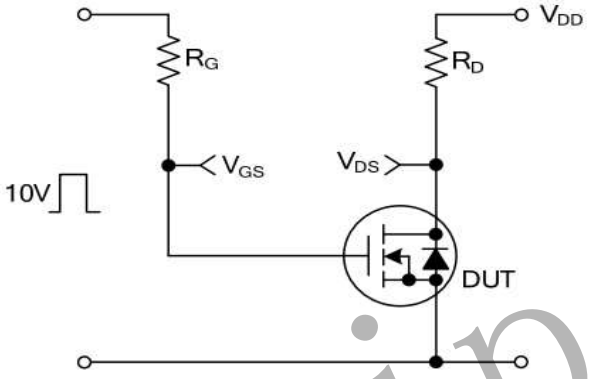
TEST CIRCUITS AND WAVEFORMS(Cont.)



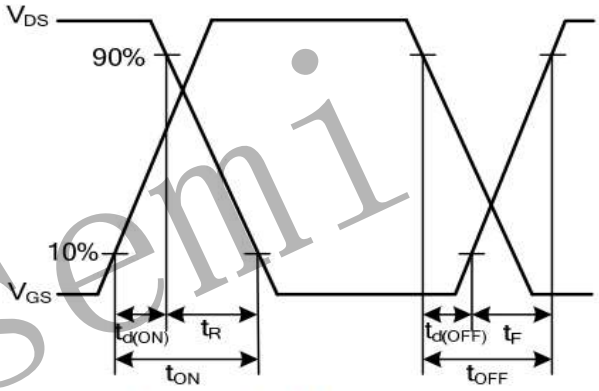
Gate Charge Test Circuit



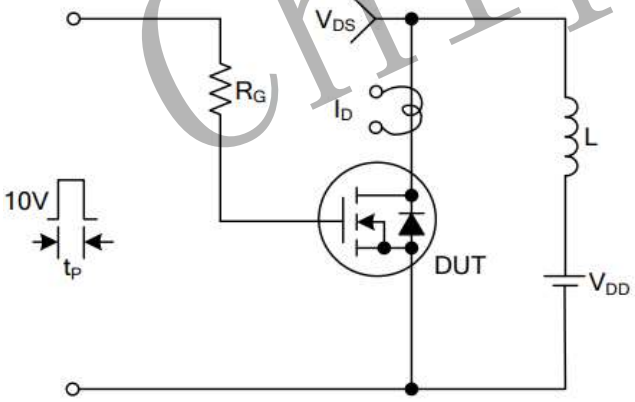
Gate Charge Waveforms



Resistive Switching Test Circuit

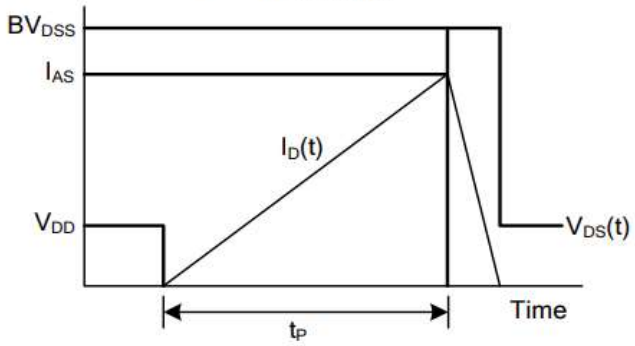


Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit

$$E_{AS}=\frac{1}{2}LI_{AS}^{2}\frac{BV_{DSS}}{BV_{DSS}-V_{DD}}$$



Unclamped Inductive Switching Waveforms

Attentions

- Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
- When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
- MOSFET is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
- Chipsemi reserves the right to make changes in this specification sheet and is subject to change without prior notice.

Appendix

Revision history:

Date	REV.	Description	Page
2023.3	1.0	Original	6