



7N10

Preliminary

Power MOSFET

7 Amps, 100 Volts N-CHANNEL POWER MOSFET

DESCRIPTION

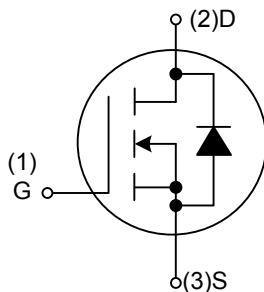
The UTC **7N10** is an N-Channel enhancement mode power FET, providing customers with excellent switching performance and minimum on-state resistance. The UTC **7N10** uses planar stripe and DMOS technology to provide perfect quality. This device can also withstand high energy pulse in the avalanche and the commutation mode.

The UTC **7N10** is generally applied in low voltage applications, such as DC motor controls, audio amplifiers and high efficiency switching DC/DC converters.

FEATURES

- * Low Gate Charge: 5.8 nC (TYP.)
- * Low C_{RSS} : 10 pF (TYP.)
- * 7A, 100V, $R_{DS(ON)} = 0.35\Omega @V_{GS} = 10V$
- * Fast Switching
- * Improved dv/dt Capability

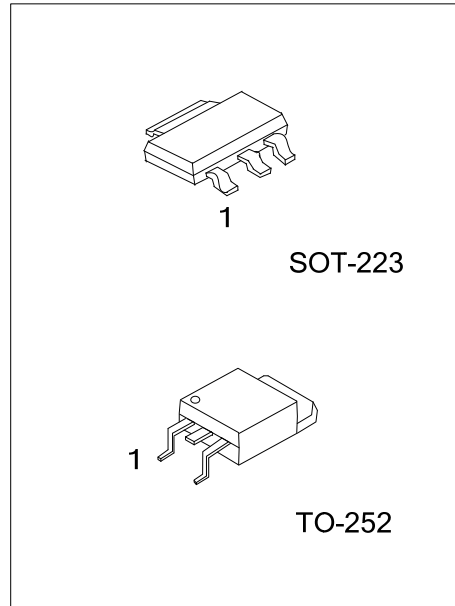
SYMBOL



ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
7N10L-AA3-R	7N10G-AA3-R	SOT-223	G	D	S	Tape Reel
7N10L-TN3-R	7N10G-TN3-R	TO-252	G	D	S	Tape Reel

<p>7N10G-AA3-R</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p>	<p>(1) R: Tape Reel</p> <p>(2) AA3: SOT-223, TN3: TO-252</p> <p>(3) G: Halogen Free, L:Lead Free</p>
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■ ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain -Source Voltage		V_{DSS}	100	V
Gate-Source Voltage		V_{GSS}	± 25	V
Continuous Drain Current	$T_C=25^\circ\text{C}$	I_D	7	A
	$T_C=70^\circ\text{C}$	I_D	6.8	A
Pulsed Drain Current (Note 2)		I_{DM}	16	A
Avalanche Current (Note 2)		I_{AR}	7	A
Repetitive Avalanche Energy (Note 2)		E_{AR}	0.2	mJ
Single Pulsed Avalanche Energy (Note 3)		E_{AS}	50	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	6.0	V/ns
Power Dissipation	$T_C=25^\circ\text{C}$	SOT-223	2.0	W
		TO-252	2.5	
	Derate above 25°C	SOT-223	0.016	W/ $^\circ\text{C}$
		TO-252	0.02	
Operating Junction Temperature		T_J	-55 ~ +150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Note: 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. $L=26\text{mH}$, $I_{AS}=1.7\text{A}$, $V_{DD}=25\text{V}$, $R_G=25\Omega$ Starting $T_J=25^\circ\text{C}$
4. $I_{SD}\leq 7.3\text{A}$, $di/dt\leq 300\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	SOT-223	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-252		50	

Note: When mounted on the minimum pad size recommended (PCB Mount)

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0\text{V}$, $I_D=250\mu\text{A}$	100			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to 25°C , $I_D=250\mu\text{A}$		0.1		V/ $^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=100\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=80\text{V}$, $T_C=125^\circ\text{C}$			10	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 25\text{V}$, $V_{DS}=0\text{V}$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}$, $I_D=250\mu\text{A}$	2.0		4.0	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=3.5\text{A}$		0.28	0.35	Ω
Forward Transconductance	g_{FS}	$V_{DS}=40\text{V}$, $I_D=0.85\text{A}$ (Note 1)		1.85		S
DYNAMIC PARAMETERS						
Input Capacitance	C_{ISS}	$V_{DS}=25\text{V}$, $V_{GS}=0\text{V}$, $f=1.0\text{MHz}$		190	250	pF
Output Capacitance	C_{OSS}			60	75	pF
Reverse Transfer Capacitance	C_{RSS}			10	13	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q_G	$V_{GS}=10\text{V}$, $V_{DS}=80\text{V}$, $I_D=7.3\text{A}$ (Note 1,2)		5.8	7.5	nC
Gate Source Charge	Q_{GS}			1.4		nC
Gate Drain Charge	Q_{GD}			2.5		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=50\text{V}$, $I_D=7.3\text{A}$, $R_G=25\Omega$ (Note 1,2)		7	25	ns
Turn-ON Rise Time	t_R			24	60	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			13	35	ns
Turn-OFF Fall-Time	t_F			19	50	ns

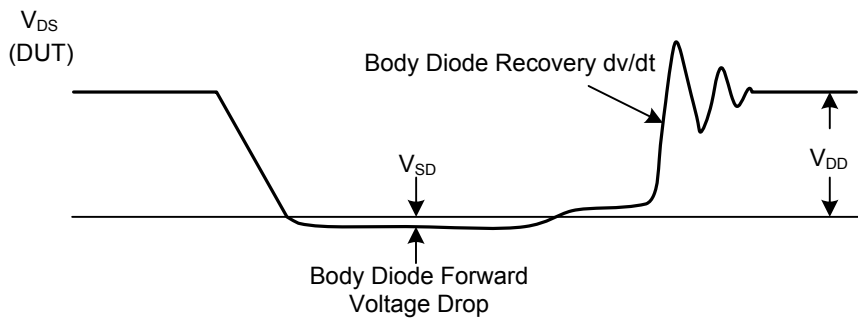
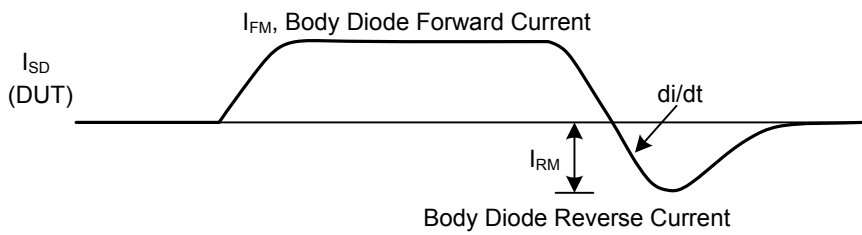
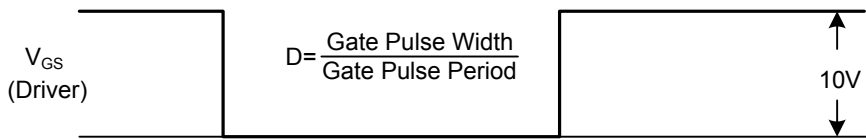
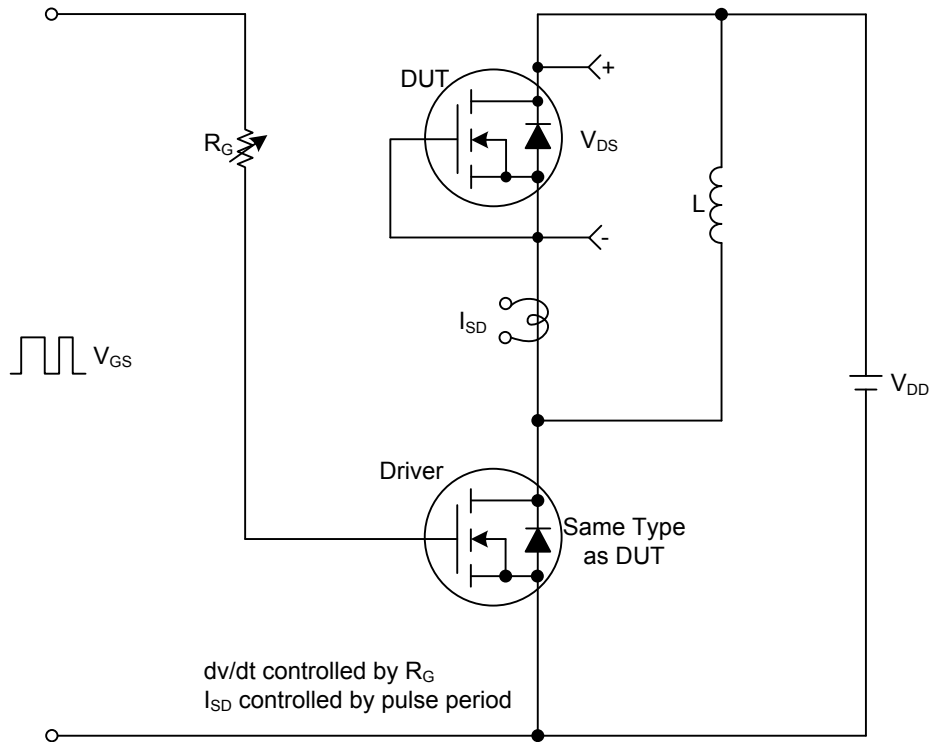
■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I_S				7	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				16	A
Drain-Source Diode Forward Voltage	V_{SD}	$I_S = 7A, V_{GS} = 0V$			1.5	V
Reverse Recovery Time	t_{RR}	$V_{GS} = 0V, I_S = 7.3A, di_F/dt = 100A/\mu s$		70		ns
Reverse Recovery Charge	Q_{RR}			150		nC

- Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$
 2. Essentially independent of operating temperature

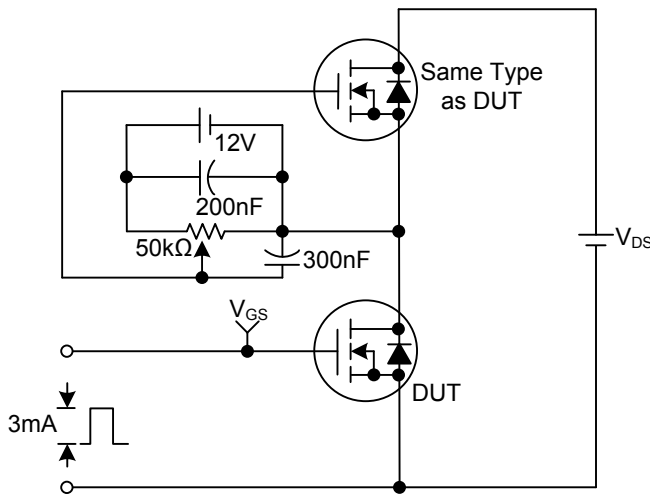
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms

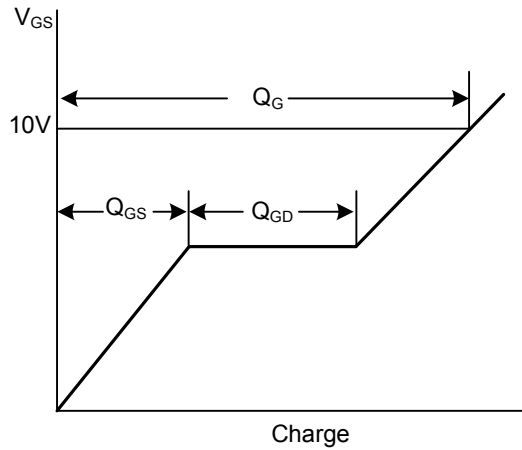


■ TEST CIRCUITS AND WAVEFORMS (Cont.)

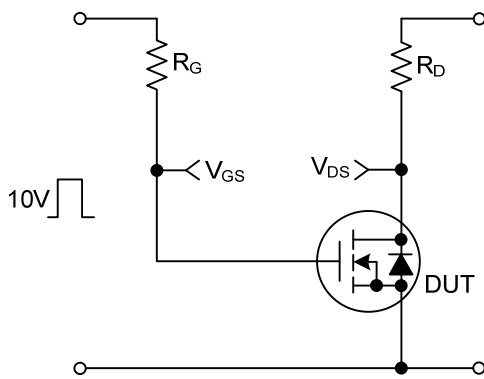
Gate Charge Test Circuit



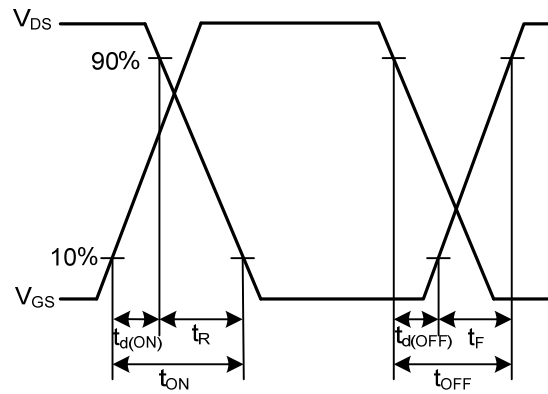
Gate Charge Waveforms



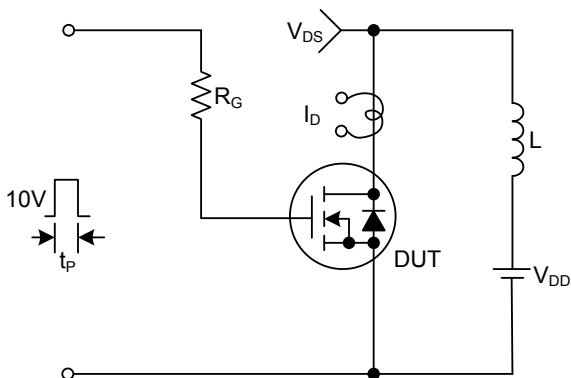
Resistive Switching Test Circuit



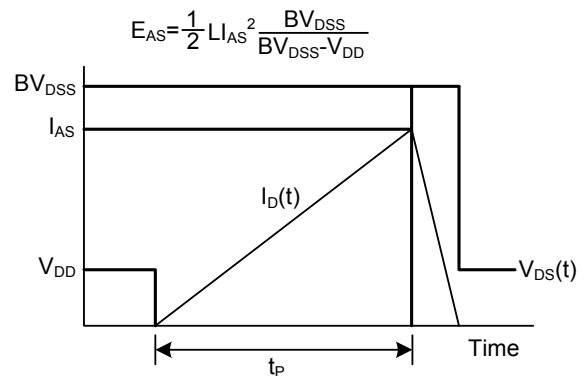
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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