



7N10

Power MOSFET

7A, 100V N-CHANNEL POWER MOSFET

DESCRIPTION

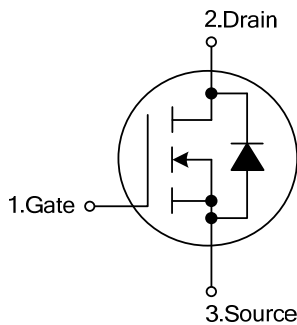
The UTC **7N10** is an N-Channel enhancement mode power MOSFET, providing customers with excellent switching performance and minimum on-state resistance. The UTC **7N10** uses planar stripe and DMOS technology to provide perfect quality. This device can also withstand high energy pulse in the avalanche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

- * $R_{DS(ON)} < 0.35\Omega @ V_{GS}=10V, I_D=3.5A$
- * Fast Switching
- * Improved dv/dt Capability

SYMBOL

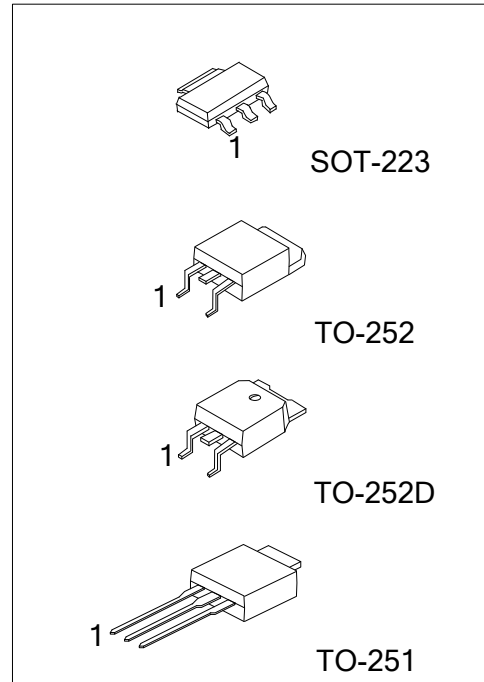


ORDERING INFORMATION

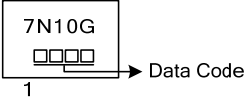
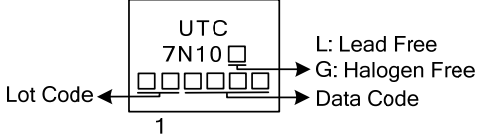
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
-	7N10G-AA3-R	SOT-223	G	D	S	Tape Reel
7N10L-TM3-T	7N10G-TM3-T	TO-251	G	D	S	Tube
7N10L-TN3-R	7N10G-TN3-R	TO-252	G	D	S	Tape Reel
7N10L-TND-R	7N10G-TND-R	TO-252D	G	D	S	Tape Reel

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

<p>7N10G-AA3-R</p>	<p>(1) R: Tape Reel, T: Tube</p> <p>(2) AA3: SOT-223, TM3: TO-251, TN3: TO-252 TND: TO-252D</p> <p>(3) G: Halogen Free and Lead Free, L: Lead Free</p>
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MARKING

SOT-223	TO-251 / TO-252 / TO-252D
 <p>A diagram of a SOT-223 package showing the marking '7N10G' above three small squares. An arrow points from the squares to the text 'Data Code'. The number '1' is located below the package.</p>	 <p>A diagram of a TO-251 / TO-252 / TO-252D package showing the marking 'UTC' above '7N10' and a small square. Below these are five small squares. An arrow points from the squares to the text 'Data Code'. An arrow points from the left side of the package to the text 'Lot Code'. The number '1' is located below the package. To the right of the package, a legend indicates: 'L: Lead Free' and 'G: Halogen Free'.</p>

■ ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ\text{C}$, 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	SOT-223	P_D	2.0	W
	TO-251/TO-252 TO-252D		2.5	
	Derate above 25°C		SOT-223	0.016
	TO-251/TO-252 TO-252D	0.02		
Operating Junction Temperature		T_J	-55 ~ +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. $L=26\text{mH}$, $I_{AS}=1.7\text{A}$, $V_{DD}=25\text{V}$, $R_G=25\Omega$ 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-251/TO-252 TO-252D		50	
	Junction to Case		SOT-223	θ_{JC}
TO-251/TO-252 TO-252D		7.5		

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

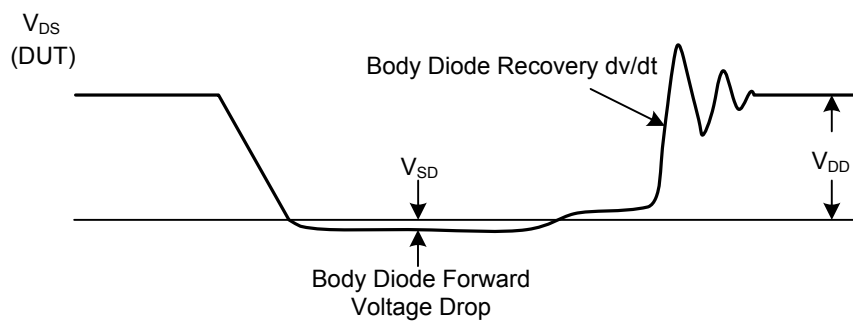
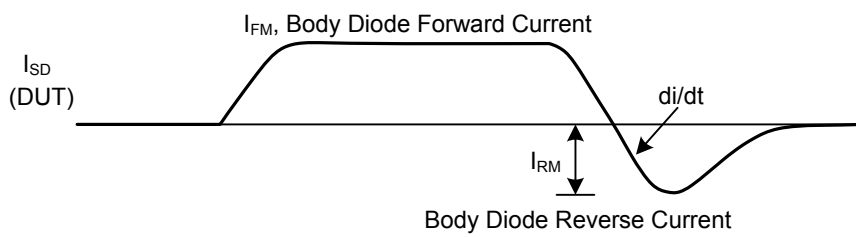
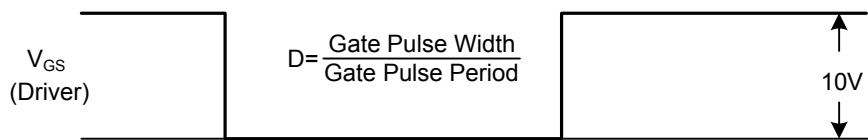
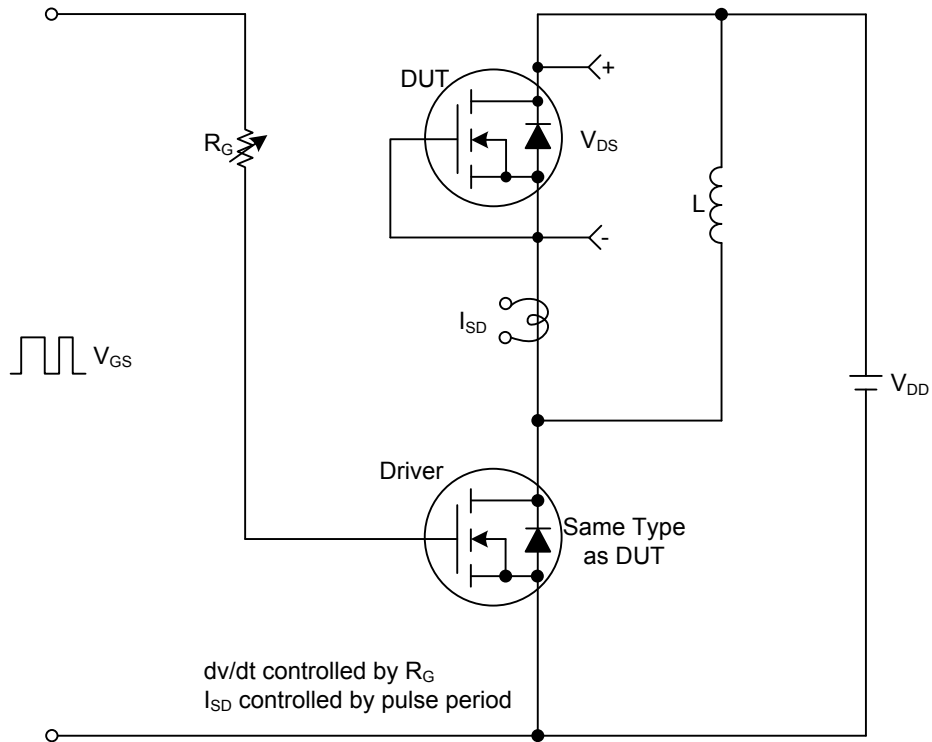
■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0V, I _D = 250μA	100			V
Breakdown Voltage Temperature Coefficient	ΔBV _{DSS} /ΔT _J	Reference to 25°C, I _D = 250μA		0.1		V/°C
Drain-Source Leakage Current	I _{DSS}	V _{DS} = 100V, V _{GS} = 0V			1	μA
		V _{DS} = 80V, T _C = 125°C			10	μA
Gate-Source Leakage Current	I _{GSS}	V _{GS} = ±25V, 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-Resistance	R _{DS(ON)}	V _{GS} = 10V, I _D = 3.5A		0.144	0.35	Ω
Forward Transconductance	g _{FS}	V _{DS} = 40V, I _D = 0.85A (Note 1)		1.85		S
DYNAMIC PARAMETERS						
Input Capacitance	C _{ISS}	V _{DS} = 25V, V _{GS} = 0V, f = 1.0MHz		380	450	pF
Output Capacitance	C _{OSS}			70	85	pF
Reverse Transfer Capacitance	C _{RSS}			11	15	pF
SWITCHING PARAMETERS						
Total Gate Charge	Q _G	V _{GS} = 10V, V _{DS} = 50V, I _D = 1.3A (Note 1, 2)		14.3		nC
Gate Source Charge	Q _{GS}			4.2		nC
Gate Drain Charge	Q _{GD}			3.2		nC
Turn-ON Delay Time	t _{D(ON)}	V _{DD} = 30V, I _D = 0.5A, R _G = 25Ω (Note 1, 2)		30	38	ns
Turn-ON Rise Time	t _R			40	50	ns
Turn-OFF Delay Time	t _{D(OFF)}			80	90	ns
Turn-OFF Fall-Time	t _F			35	40	ns
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,		70		ns
Reverse Recovery Charge	Q _{RR}	di _F /dt = 100A/μs		150		nC

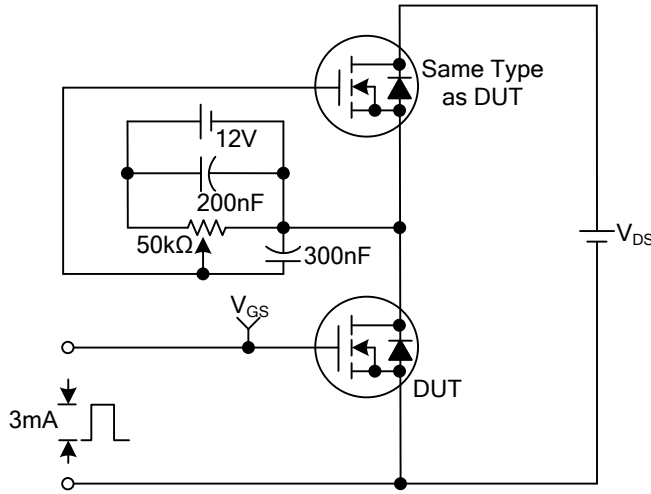
- Notes: 1. Pulse Test: Pulse width ≤ 300μs, Duty cycle ≤ 2%
2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

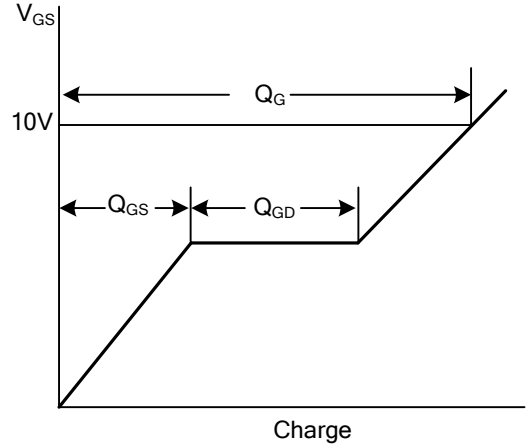
Peak Diode Recovery dv/dt Test Circuit & Waveforms



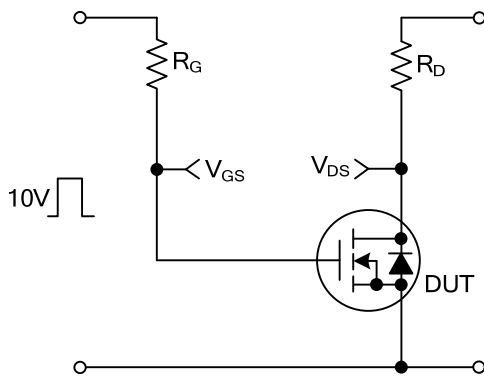
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



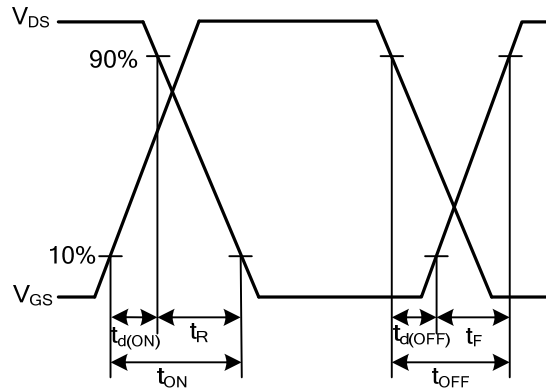
Gate Charge Test Circuit



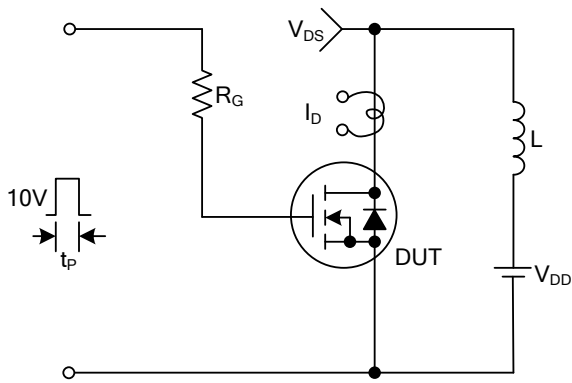
Gate Charge Waveforms



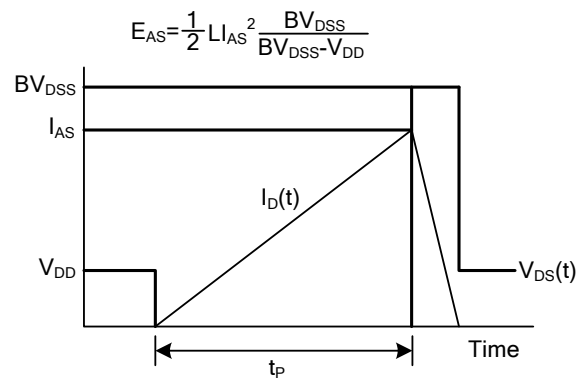
Resistive Switching Test Circuit



Resistive Switching Waveforms

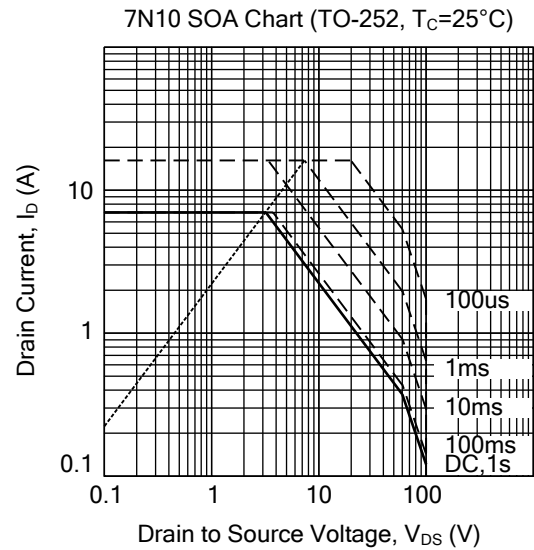
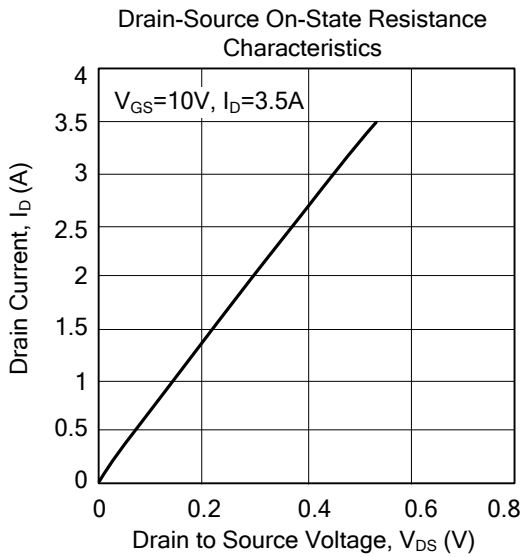
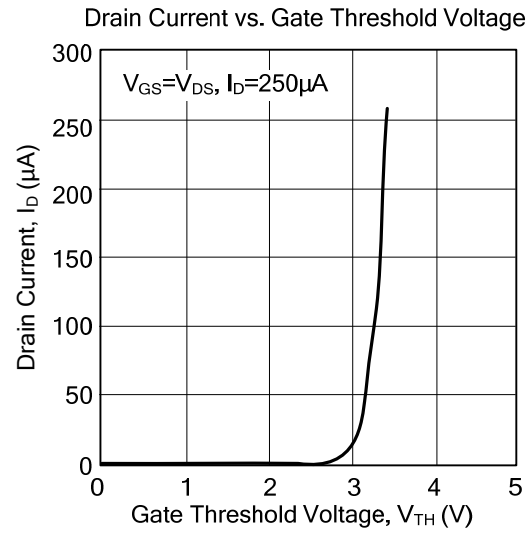
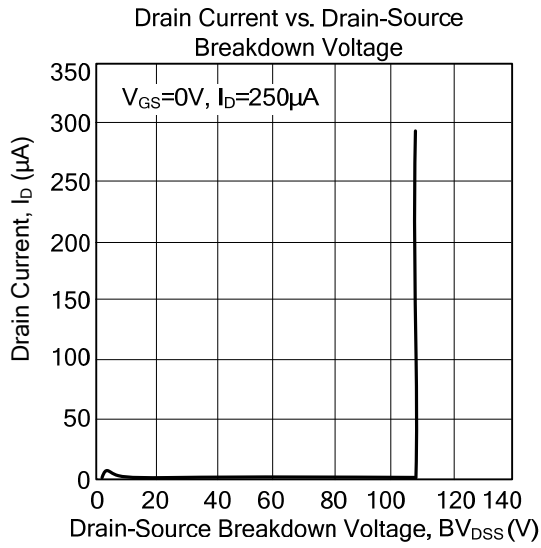


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

TYPICAL CHARACTERISTICS



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