



# 12P10

**Power MOSFET**

## 9.4A, 100V P-CHANNEL POWER MOSFET

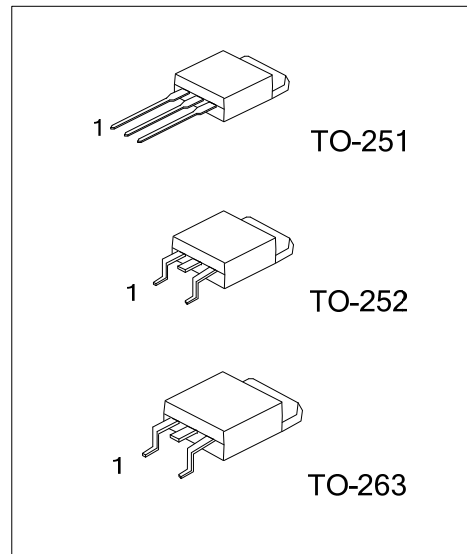
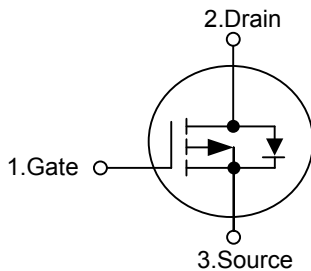
■ DESCRIPTION

The **12P10** uses advanced proprietary, planar stripe, DMOS technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with low gate voltages. This device is suitable to be used in low voltage applications such as audio amplifier, high efficiency switching DC/DC converters, and DC motor control.

■ FEATURES

- \*  $R_{DS(ON)} = 0.29\Omega @ V_{GS} = -10 V$
- \* Low capacitance
- \* Low gate charge
- \* Fast switching capability
- \* Avalanche energy specified

■ SYMBOL



■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
12P10L-TM3-T	12P10G-TM3-T	TO-251	G	D	S	Tube
12P10L-TN3-R	12P10G-TN3-R	TO-252	G	D	S	Tape Reel
12P10L-TQ2-R	12P10G-TQ2-R	TO-263	G	D	S	Tape Reel
12P10L-TQ2-T	12P10G-TQ2-T	TO-263	G	D	S	Tube

<p>12P10L-TM3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Lead Free</p>	<p>(1) R: Tape Reel, T: Tube</p> <p>(2) TM3: TO-251, TN3: TO-252, TQ2: TO-263</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		$V_{GSS}$	$\pm 30$	V
Continuous Drain Current		$I_D$	-9.4	A
Pulsed Drain Current (Note 2)		$I_{DM}$	-37.6	A
Avalanche Current (Note 2)		$I_{AR}$	-9.4	A
Single Pulsed Avalanche Energy (Note 3)		$E_{AS}$	370	mJ
Repetitive Avalanche Energy (Note 2)		$E_{AR}$	5.0	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	-6.0	V/ns
Power Dissipation	TO-251/ TO-252	$P_D$	50	W
	TO-263		65	
Junction Temperature		$T_J$	+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. Pulse width limited by  $T_{J(MAX)}$
3.  $L=6.3\text{mH}$ ,  $I_{AS}=-9.4\text{A}$ ,  $V_{DD}=-25\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$
4.  $I_{SD}\leq-11.5\text{A}$ ,  $di/dt\leq 300\mu\text{A/s}$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$

■ THERMAL DATA

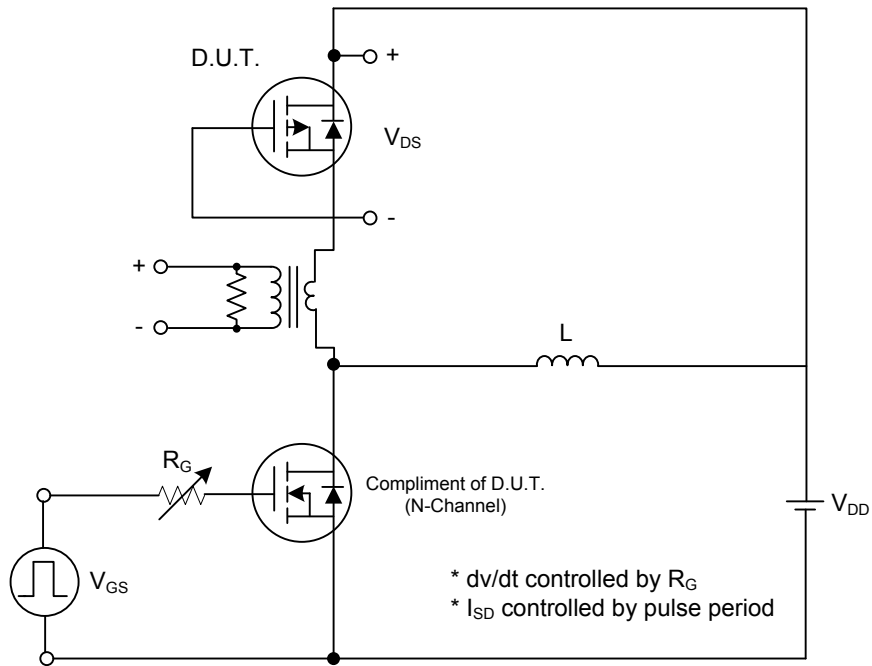
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-251/ TO-252	$\theta_{JA}$	110	$^\circ\text{C/W}$
	TO-263		62.5	
Junction to Case	TO-251/ TO-252	$\theta_{JC}$	2.5	$^\circ\text{C/W}$
	TO-263		2.31	

■ ELECTRICAL CHARACTERISTICS (T<sub>c</sub>=25°C, unless otherwise specified)

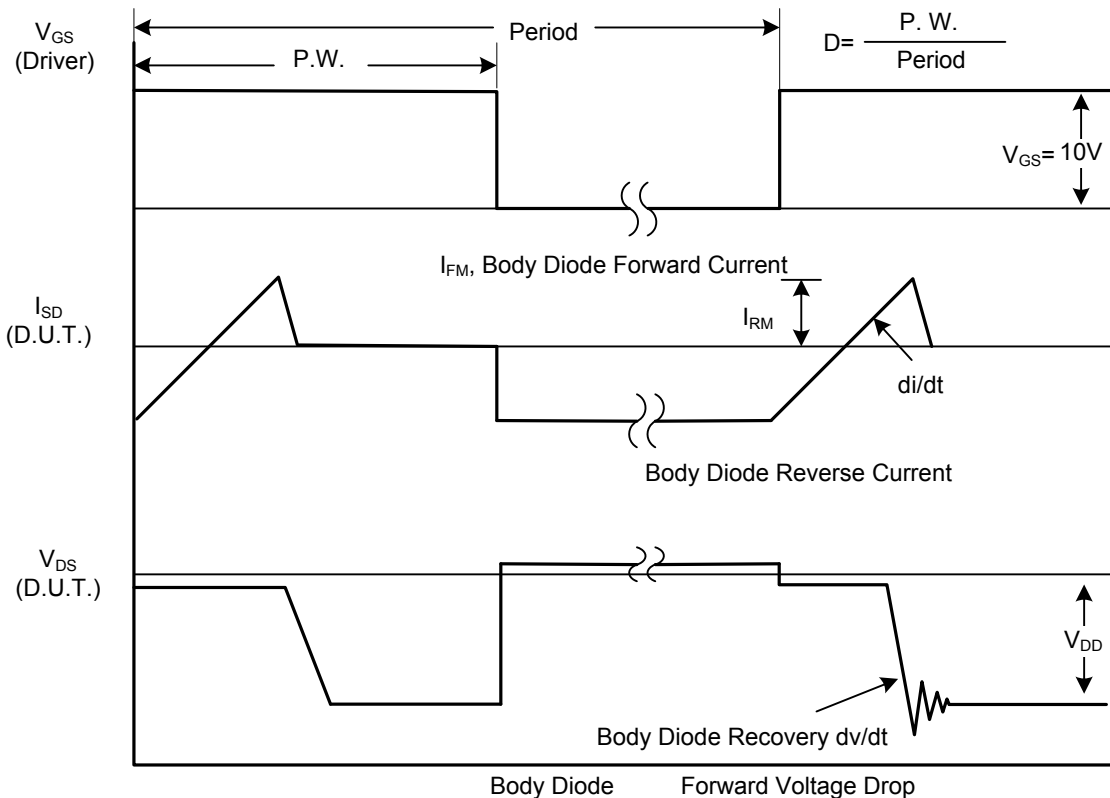
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0 V, I <sub>D</sub> =-250μA	-100			V
Breakdown Voltage Temperature Coefficient	ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	I <sub>D</sub> =-250μA, Referenced to 25°C		-0.1		V/°C
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =-100V, V <sub>GS</sub> =0V			-1	μA
Gate-Source Leakage Current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V			±100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-2.0		-4.0	V
Static Drain-Source On-Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-4.7A		0.24	0.29	Ω
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-40V, I <sub>D</sub> =-4.7A (Note 1)		6.3		S
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, f=1.0MHz		620	800	pF
Output Capacitance	C <sub>OSS</sub>			220	290	pF
Reverse Transfer Capacitance	C <sub>RSS</sub>			65	85	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	Q <sub>G</sub>	V <sub>DS</sub> =-80V, I <sub>D</sub> =-11.5A, V <sub>GS</sub> =-10V(Note 1, 2)		21	27	nC
Gate Source Charge	Q <sub>GS</sub>			4.6		nC
Gate Drain Charge	Q <sub>GD</sub>			11.5		nC
Turn-ON Delay Time	t <sub>D(ON)</sub>	V <sub>DD</sub> =-50V, I <sub>D</sub> =-11.5A, R <sub>G</sub> =25Ω(Note 1, 2)		15	40	ns
Turn-ON Rise Time	t <sub>R</sub>			160	330	ns
Turn-OFF Delay Time	t <sub>D(OFF)</sub>			35	80	ns
Turn-OFF Fall-Time	t <sub>F</sub>			60	130	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-9.4A			-4.0	V
Maximum Body-Diode Continuous Current	I <sub>S</sub>				-9.4	A
Maximum Pulsed Drain-Source Diode Forward Current	I <sub>SM</sub>				-37.6	A

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

■ TEST CIRCUITS AND WAVEFORMS

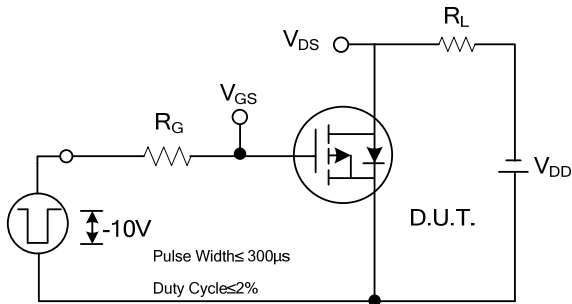


Peak Diode Recovery dv/dt Test Circuit

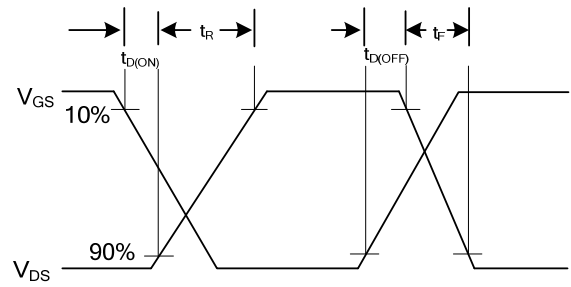


Peak Diode Recovery dv/dt Waveforms

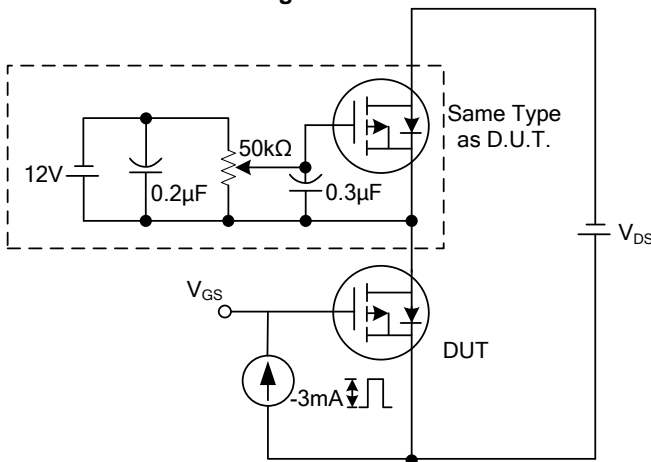
## ■ TEST CIRCUITS AND WAVEFORMS (Cont.)



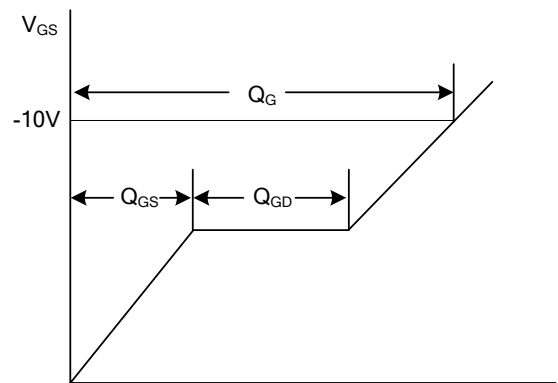
**Switching Test Circuit**



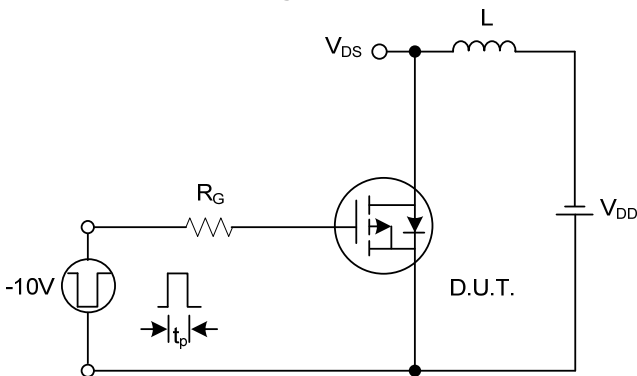
**Switching Waveforms**



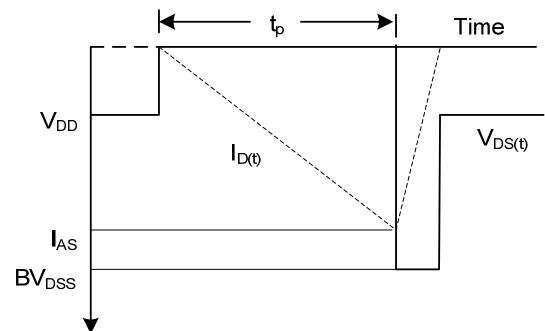
**Gate Charge Test Circuit**



**Gate Charge Waveform**

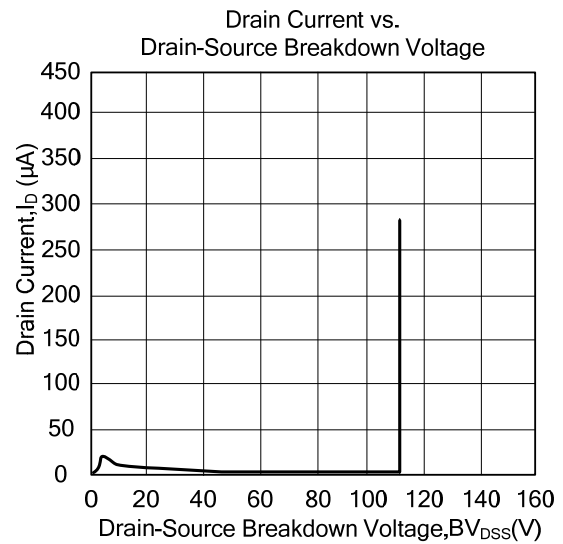
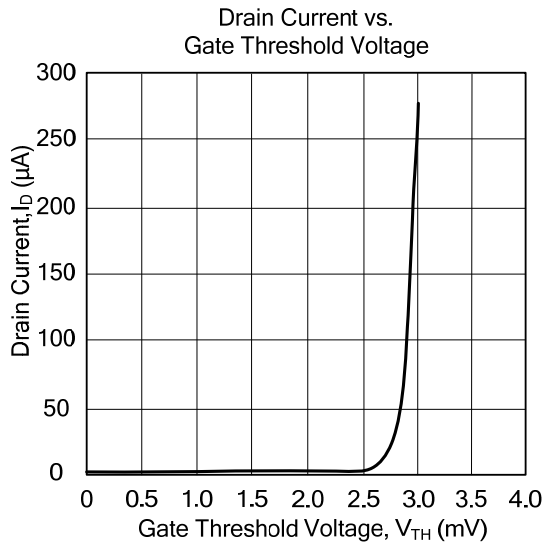
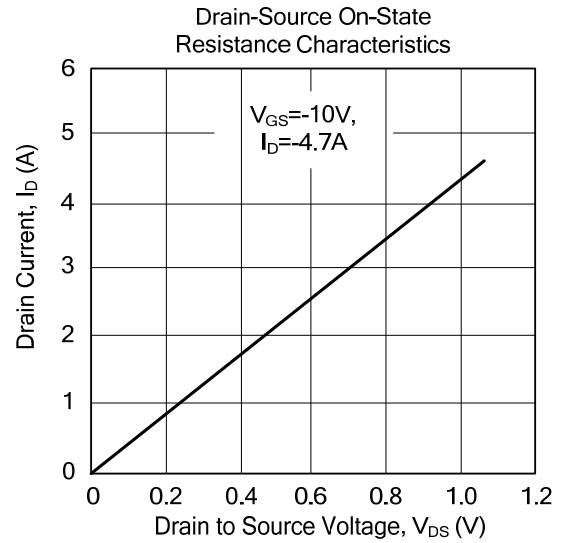
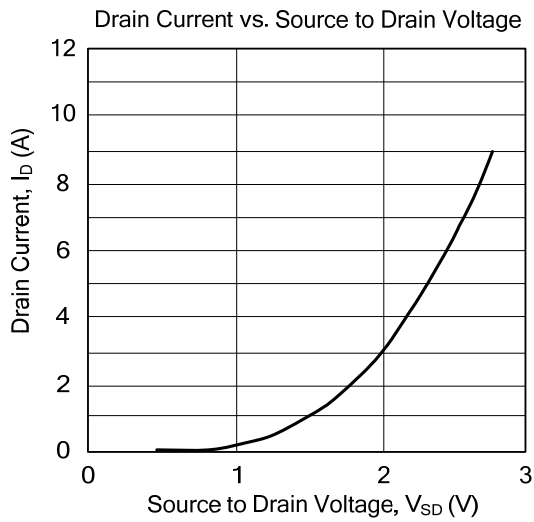


**Unclamped Inductive Switching Test Circuit**



**Unclamped Inductive Switching Waveforms**

## TYPICAL CHARACTERISTICS



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