



4N170-P

Preliminary

Power MOSFET

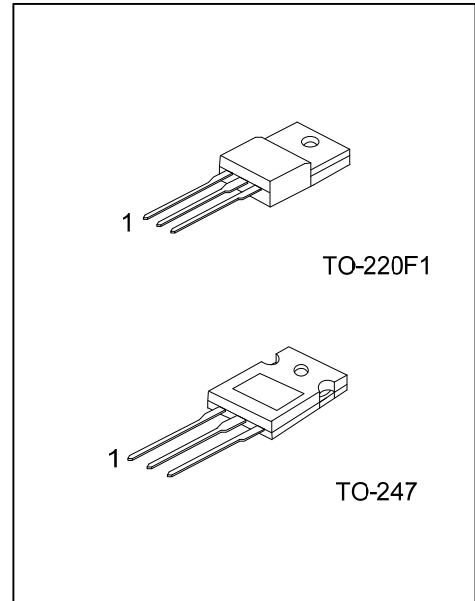
4.0A, 1700V N-CHANNEL POWER MOSFET

DESCRIPTION

The **4N170-P** provide excellent $R_{DS(ON)}$, low gate charge and operation with low gate voltages. This device is suitable for use as a load switch or in PWM applications.

FEATURES

- * $R_{DS(ON)} \leq 5.5 \Omega$ @ $V_{GS}=10V$, $I_D=2.0A$
- * Low on-resistance
- * Fast switching speed
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness



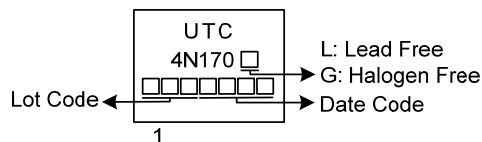
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4N170L-TF1-T	4N170G-TF1-T	TO-220F1	G	D	S	Tube
4N170L-T47-T	4N170G-T47-T	TO-247	G	D	S	Tube

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

4N170G-TF1-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube (2) TF1: TO-220F1, T47: TO-247 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING



■ **ABSOLUTE MAXIMUM RATINGS** ($T_C=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DS}	1700	V
Gate-Source Voltage		V_{GS}	± 30	V
Drain Current	Continuous	I_D	4	A
	Pulsed (Note 2)	I_{DM}	8	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	48	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.3	V/ns
Power Dissipation	TO-220F1	P_D	42	W
	TO-247		155	W
Junction Temperature		T_J	+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. $L = 30\text{mH}$, $I_{AS} = 1.8\text{A}$, $V_{DD} = 50\text{V}$, $R_G = 25\ \Omega$ Starting $T_J = 25^{\circ}\text{C}$

4. $I_{SD} \leq 4.0\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^{\circ}\text{C}$

■ **THERMAL DATA**

PARAMETER		SYMBOL	RATING	UNIT
Junction to Ambient	TO-220F1	θ_{JA}	62.5	$^{\circ}\text{C}/\text{W}$
	TO-247		50	$^{\circ}\text{C}/\text{W}$
Junction to Case	TO-220F1	θ_{JC}	2.97	$^{\circ}\text{C}/\text{W}$
	TO-247		0.8	$^{\circ}\text{C}/\text{W}$

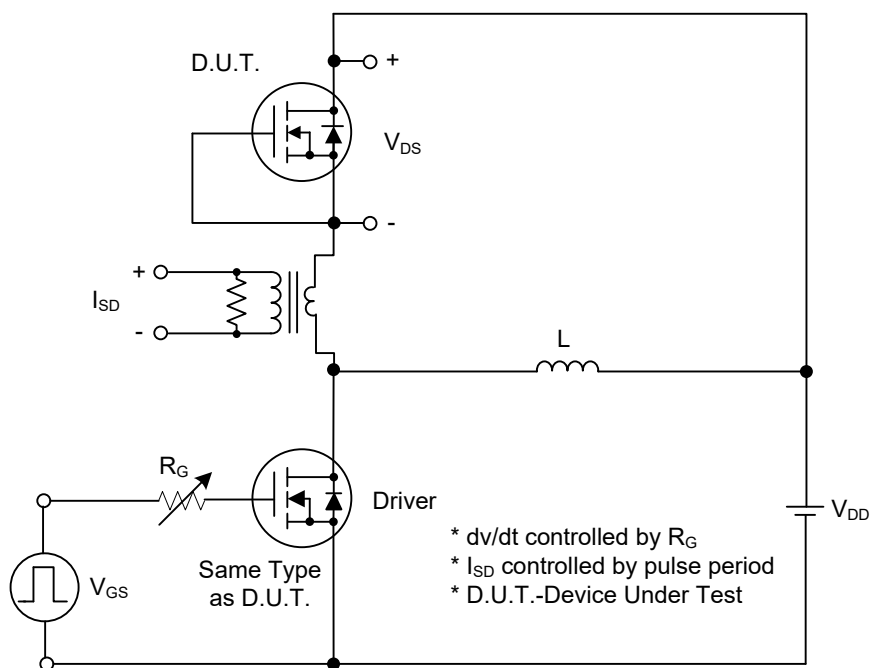
■ **ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$, unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV _{DSS}	I _D =250μA, V _{GS} =0V	1700			V
Drain-Source Leakage Current		I _{DSS}	V _{DS} =1700V, 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	3.0		5.0	V
Static Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =2.0A			5.5	Ω
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{GS} =0V, V _{DS} =25V, f=1.0MHz		1370		pF
Output Capacitance		C _{OSS}			137		pF
Reverse Transfer Capacitance		C _{RSS}			37		pF
SWITCHING PARAMETERS							
Total Gate Charge (Note 1)		Q _G	V _{DS} =1360V, V _{GS} =10V, I _D =4.0A (Note 1, 2)		90		nC
Gate to Source Charge		Q _{GS}			18		nC
Gate to Drain Charge		Q _{GD}			45		nC
Turn-ON Delay Time (Note 1)		t _{D(ON)}	V _{DD} =100V, V _{GS} =10V, I _D =4.0A, R _G =25Ω (Note 1, 2)		11		ns
Rise Time		t _R			17		ns
Turn-OFF Delay Time		t _{D(OFF)}			38		ns
Fall-Time		t _F			33		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Continuous Drain-Source Diode Forward Current		I _S				4	A
Maximum Pulsed Drain-Source Diode Forward Current		I _{SM}				8	A
Drain-Source Diode Forward Voltage (Note 1)		V _{SD}	I _S =4.0A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{rr}	I _S =4.0A, V _{GS} =0V,		1250		ns
Body Diode Reverse Recovery Charge		Q _{rr}	dI _F /dt=100A/μs		13.5		μC

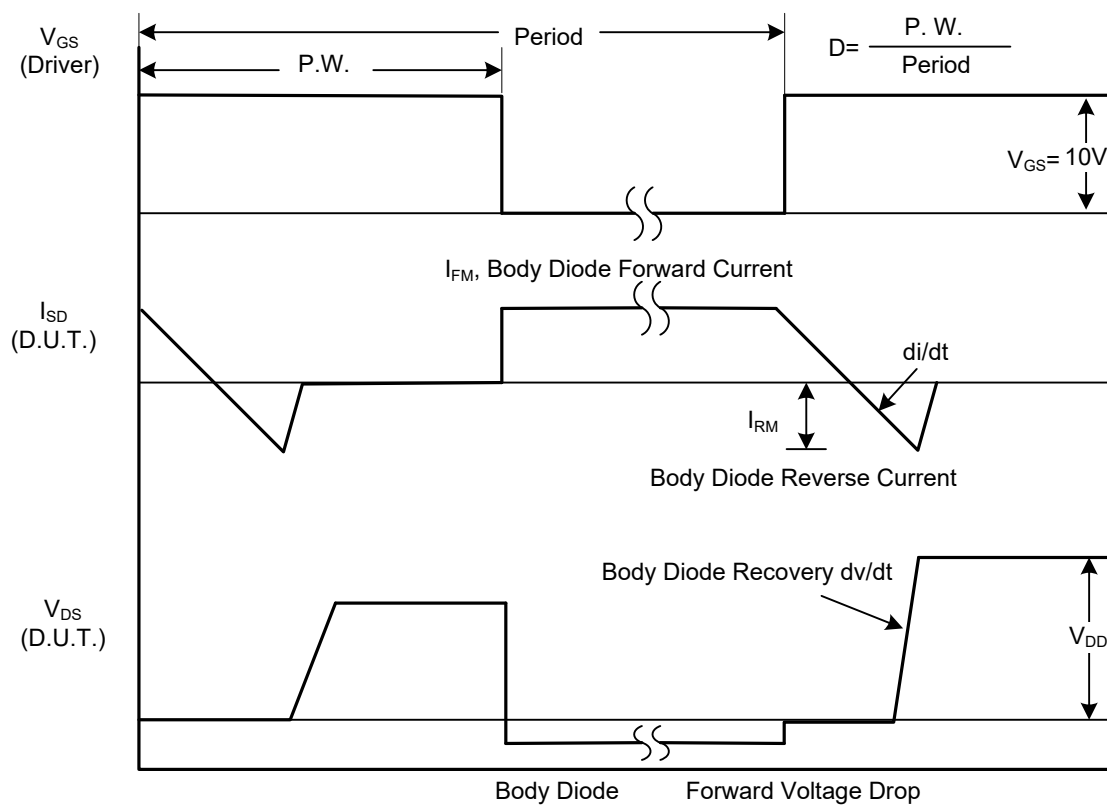
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

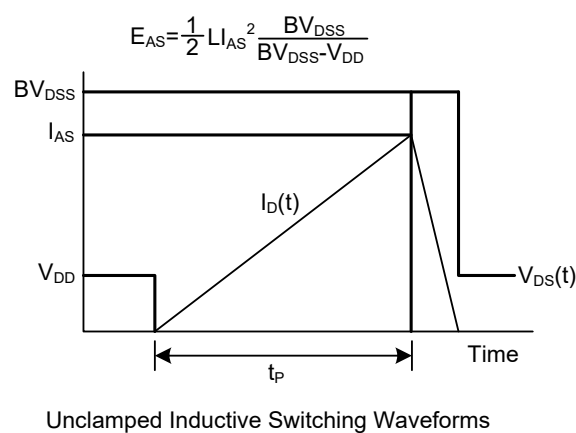
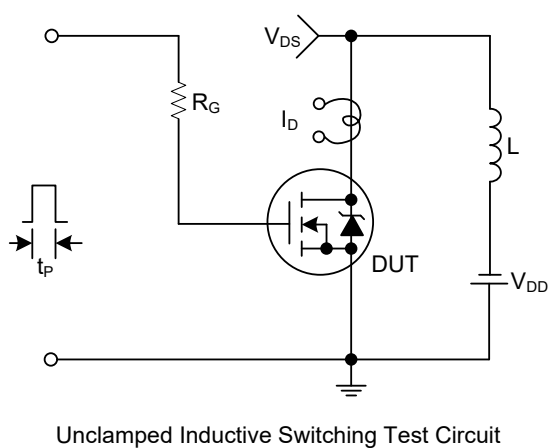
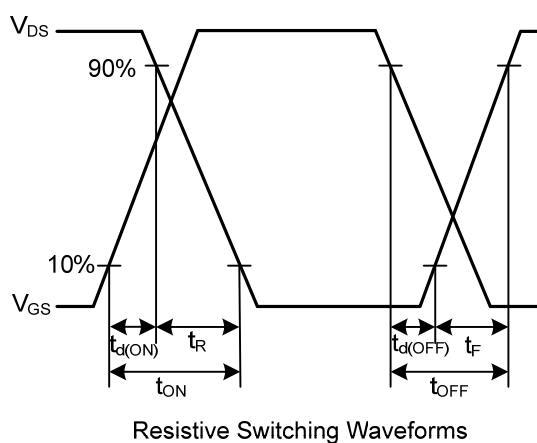
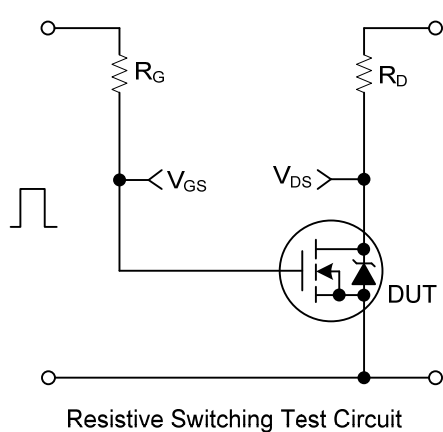
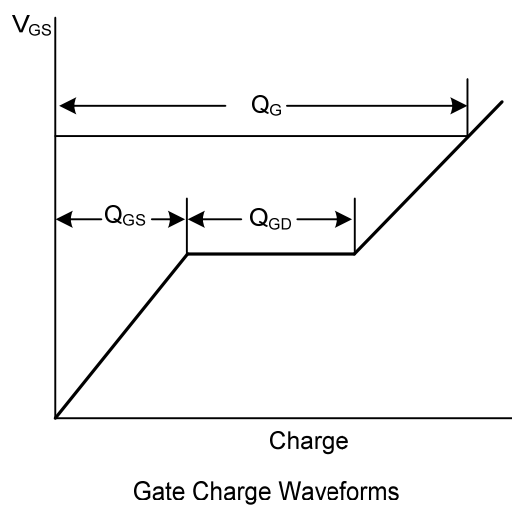
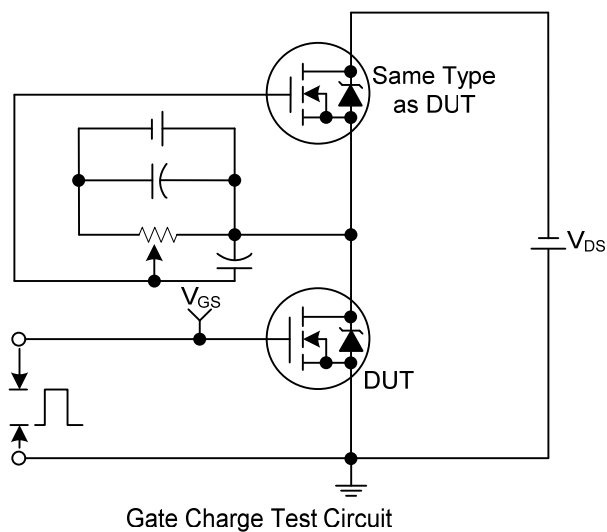


Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms

■ TEST CIRCUITS AND WAVEFORMS



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