

**4N170-E4**

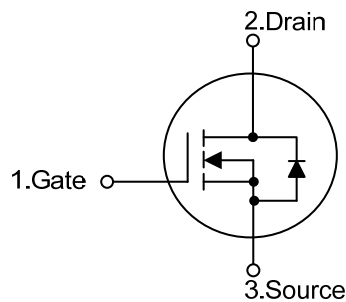
Preliminary

Power MOSFET**4.0A, 1700V N-CHANNEL
POWER MOSFET****DESCRIPTION**

The UTC **4N170-E4** 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

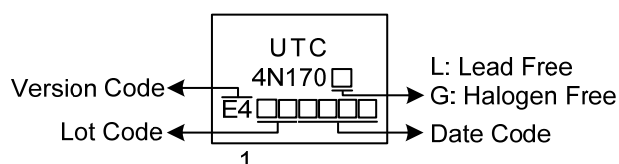
- * $R_{DS(ON)} \leq 5.3 \Omega$ @ $V_{GS}=10V$, $I_D=2.0A$
- * Low Reverse Transfer Capacitance
- * Fast Switching Capability
- * Avalanche Energy Specified
- * Improved dv/dt Capability, High Ruggedness

SYMBOL**ORDERING INFORMATION**

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
4N170L-E4-T47-T	4N170G-E4-T47-T	TO-247	G	D	S	Tube

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

4N170G-E4-T47-T		(1) Packing Type	(1) T: Tube
		(2) Package Type	(2) T47: TO-247
		(3) Version Code	(3) Version E4
		(4) Green Package	(4) G: Halogen Free and Lead Free, L: Lead Free

MARKING

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

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	1700	V
Gate-Source Voltage		V_{GSS}	± 30	V
Drain Current	Continuous	I_D	4	A
	Pulsed (Note 2)	I_{DM}	8	A
Avalanche Energy	Single Pulsed (Note 3)	E_{AS}	297.5	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	1.5	V/ns
Power Dissipation		P_D	158	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. $L = 30\text{mH}$, $I_{AS} = 4.5\text{A}$, $V_{DD} = 90\text{V}$, $R_G = 25\Omega$, 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	θ_{JA}	50	$^{\circ}\text{C}/\text{W}$
Junction to Case	θ_{JC}	0.83	$^{\circ}\text{C}/\text{W}$

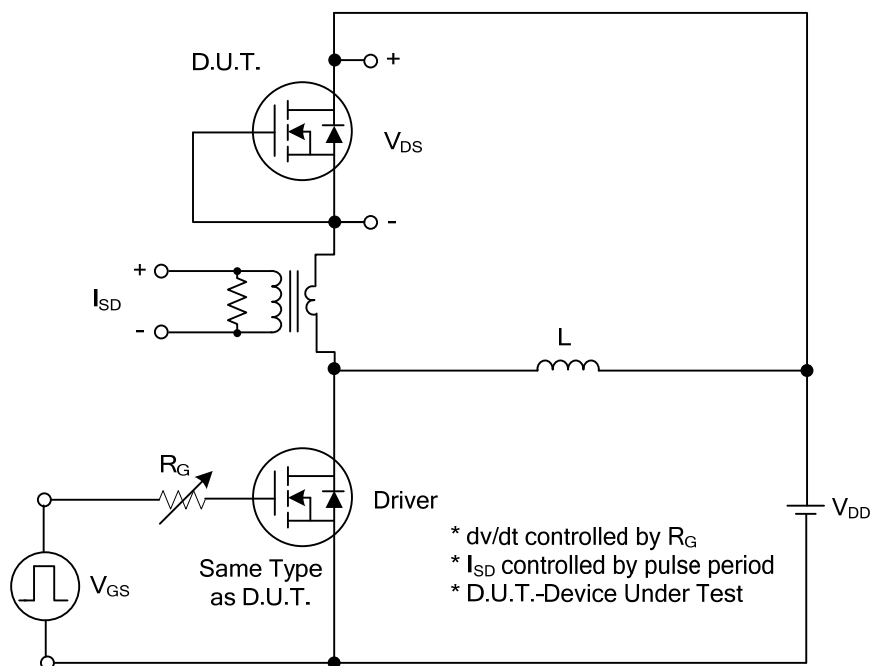
■ **ELECTRICAL CHARACTERISTICS** ($T_J=25^{\circ}\text{C}$, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	1700			V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =1700V, V _{GS} =0V			10	μA
Gate-Source Leakage Current	I _{GSS}	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			5.3	Ω
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1MHz		1734		pF
Output Capacitance	C _{OSS}			149		pF
Reverse Transfer Capacitance	C _{RSS}			24		pF
SWITCHING CHARACTERISTICS						
Total Gate Charge (Note 1)	Q _G	V _{DS} =1360V, V _{GS} =10V, I _D =4.0A (Note 1, 2)		60		nC
Gate-Source Charge	Q _{GS}			12		nC
Gate-Drain Charge	Q _{GD}			27		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)		34		ns
Turn-On Rise Time	t _R			31		ns
Turn-Off Delay Time	t _{D(OFF)}			184		ns
Turn-Off Fall Time	t _F			56		ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Maximum Continuous Drain-Source Diode Forward Current	I _S				4	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 (Note 1)	t _{rr}	I _S =4.0A, V _{GS} =0V,		812		nS
Body Diode Reverse Recovery Charge	Q _{rr}	dl _F /dt=100A/μs		9.7		uC

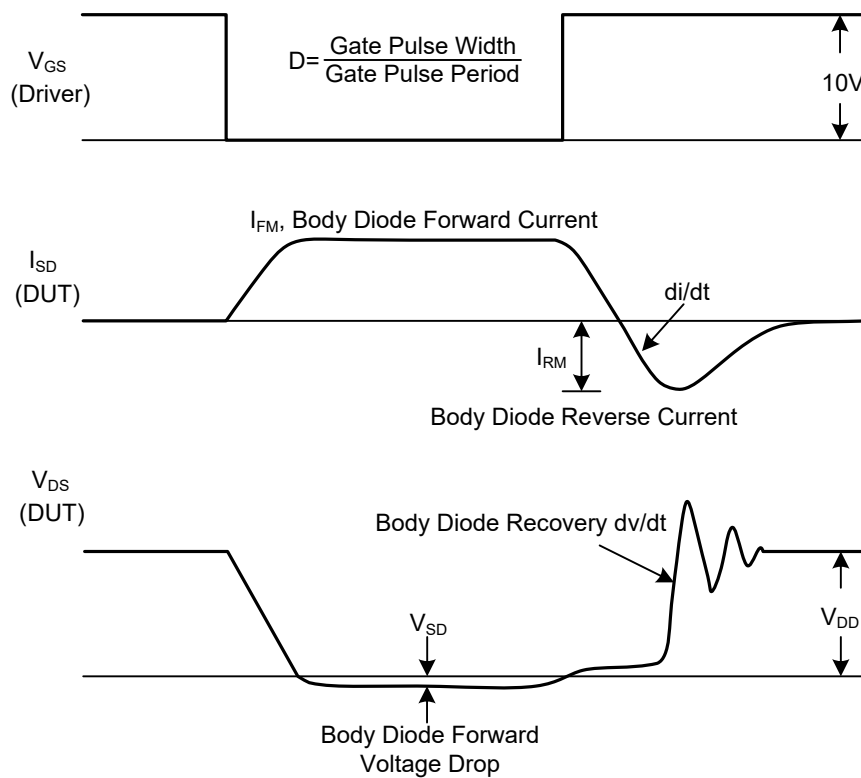
Notes: 1. Pulse Test: Pulse width $\leq 300\mu\text{s}$, Duty cycle $\leq 2\%$.

2. Essentially independent of operating temperature.

■ TEST CIRCUITS AND WAVEFORMS

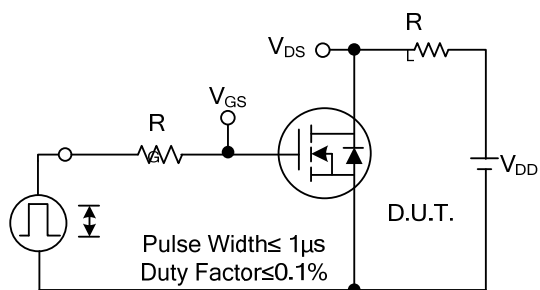


Peak Diode Recovery dv/dt Test Circuit

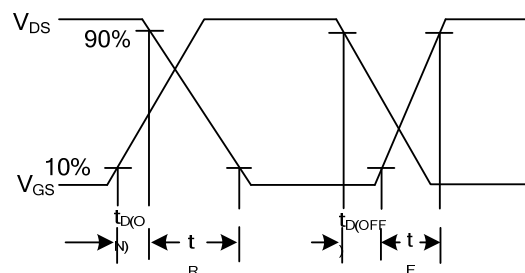


Peak Diode Recovery dv/dt Waveforms

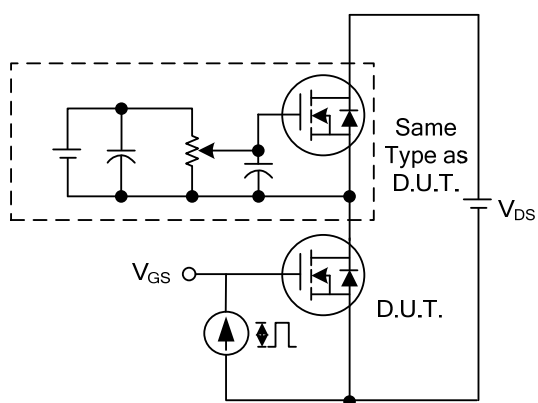
■ TEST CIRCUITS AND WAVEFORMS



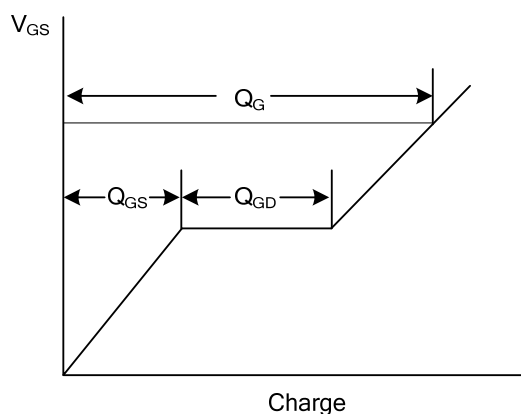
Switching Test Circuit



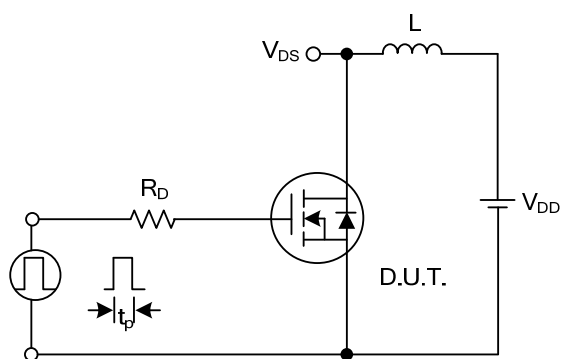
Switching Waveforms



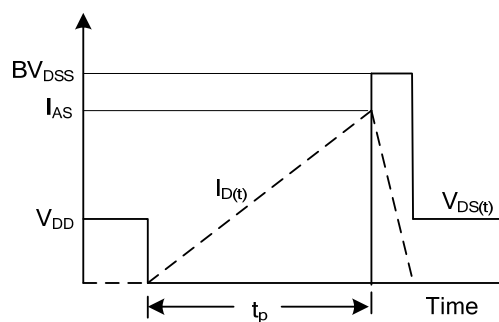
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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