

**6N40**

Preliminary

Power MOSFET

**6 Amps, 400 Volts
N-CHANNEL POWER MOSFET**

■ DESCRIPTION

The UTC **6N40** is an N-Channel enhancement mode Power FET using UTC's perfect planar stripe, DMOS technology to provide customers with superior switching performance and minimum on-state resistance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **6N40** is generally used in applications, such as electronic lamp ballasts based on half bridge topology and high efficiency switched mode power supplies.

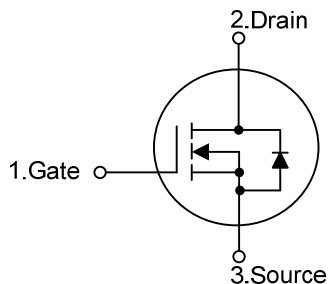
■ FEATURES

* 6A, 400V, $R_{DS(ON)}=1.0\Omega$ @ $V_{GS}=10V$

* Fast switching speed

* Improved dv/dt capability

■ SYMBOL

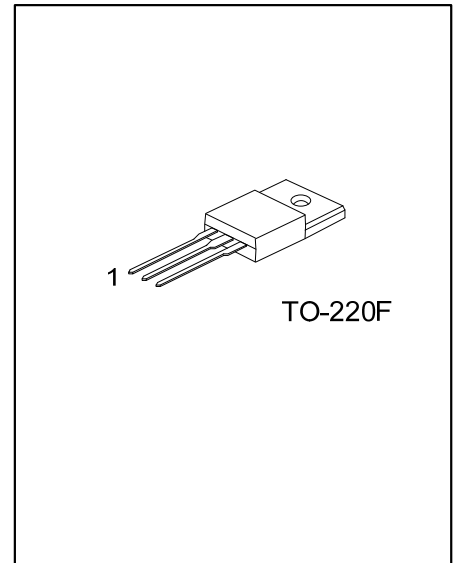


■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N40L-TF3-T	6N40G-TF3-T	TO-220F	G	D	S	Tube

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

 6N40L - TF3 - T (1) Packing Type (2) Package Type (3) Lead Free		(1) T: Tube (2) TF3: TO-220F (3) G: Halogen Free, L: Lead Free
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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}	400	V
Gate-Source Voltage		V_{GSS}	± 30	V
Avalanche Current (Note 1)		I_{AR}	6	A
Drain Current	Continuous	I_D	6 (Note 6)	A
	Pulsed (Note 1)	I_{DM}	24 (Note 6)	A
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	270	mJ
	Repetitive (Note 1)	E_{AR}	7.3	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Power Dissipation		P_D	38	W
Junction Temperature		T_J	+150	$^\circ\text{C}$
Storage Temperature		T_{STG}	-55 ~ +150	$^\circ\text{C}$

Note: 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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	62.5	$^\circ\text{C/W}$
Junction to Case	θ_{JC}	3.31	$^\circ\text{C/W}$

■ 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} =0V, I _D =250μA	400			V
Breakdown Voltage Temperature Coefficient		ΔBV _{DSS} /ΔT _J	I _D =250μA, Referenced to 25°C		0.54		V/°C
Drain-Source Leakage Current		I _{DSS}	V _{DS} =400V, V _{GS} =0V			1	μA
			V _{DS} =320V, T _J =125°C			10	μA
Gate-Source Leakage Current	Forward	I _{GSS}	V _{DS} =0V, V _{GS} =+30V			+100	nA
	Reverse		V _{DS} =0V, V _{GS} =-30V			-100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage		V _{GS(TH)}	V _{DS} =V _{GS} , I _D =250μA	2.0		4.0	V
Drain-Source On-State Resistance		R _{DS(ON)}	V _{GS} =10V, I _D =3A		0.83	1	Ω
Forward Transconductance		g _{FS}	V _{DS} =40V, I _D =3A (Note 4)		4.7		S
DYNAMIC PARAMETERS							
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		480	625	pF
Output Capacitance		C _{OSS}			80	105	pF
Reverse Transfer Capacitance		C _{RSS}			15	20	pF
SWITCHING PARAMETERS							
Total Gate Charge		Q _G	V _{DS} =320V, V _{GS} =10V, I _D =6A (Note 4,5)		16	20	nC
Gate-Source Charge		Q _{GS}			2.3		nC
Gate-Drain Charge		Q _{GD}			8.2		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =200V, I _D =6A, R _G =25Ω (Note 4,5)		13	35	ns
Turn-ON Rise Time		t _R			65	140	ns
Turn-OFF Delay Time		t _{D(OFF)}			21	55	ns
Turn-OFF Fall Time		t _F			38	85	ns
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Maximum Body-Diode Continuous Current		I _S				6	A
Maximum Body-Diode Pulsed Current		I _{SM}				24	A
Drain-Source Diode Forward Voltage		V _{SD}	I _S =6A, V _{GS} =0V			1.4	V
Body Diode Reverse Recovery Time		t _{RR}	V _{GS} =0V, I _S =6A,		230		ns
Body Diode Reverse Recovery Charge		Q _{RR}	dI _F /dt=100A/μs (Note 4)		1.7		μC

Notes: 1. Repetitive Rating : Pulse width limited by maximum junction temperature

2. $L=13.7\text{mH}$, $I_{AS}=6A$, $V_{DD}=50V$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$

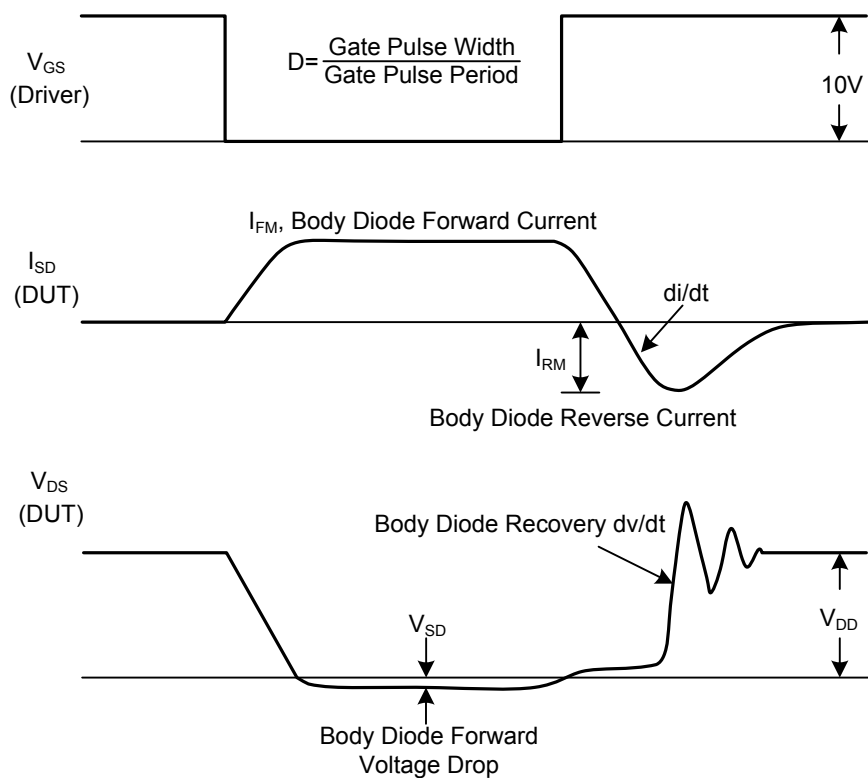
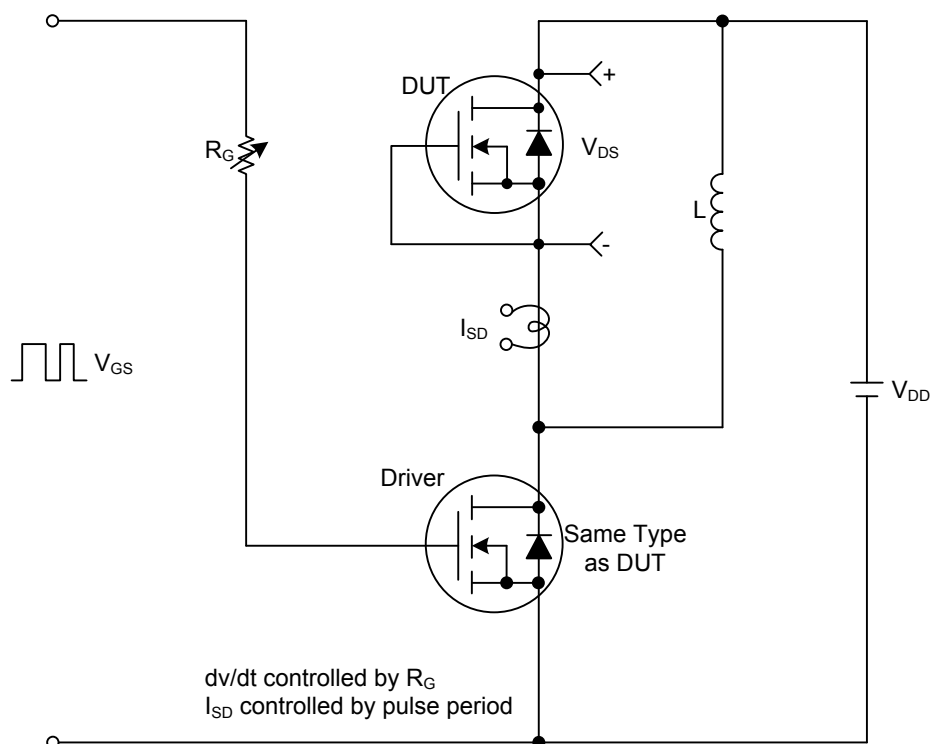
3. $I_{SD} \leq 6A$, $di/dt \leq 200A/\mu s$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$

4. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

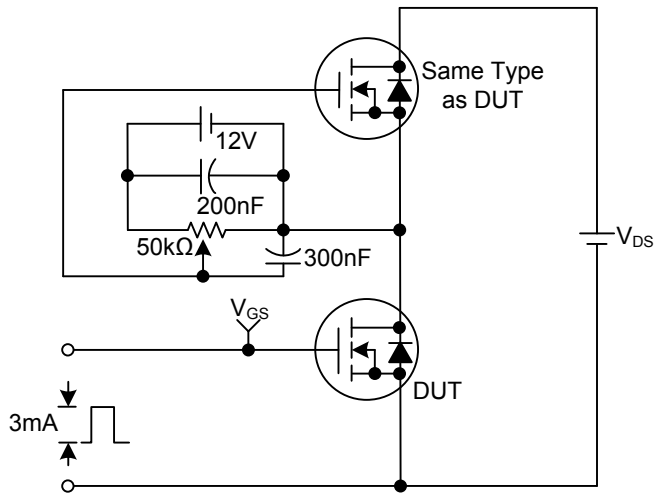
5. Essentially independent of operating temperature

6. Drain current limited by maximum junction temperature

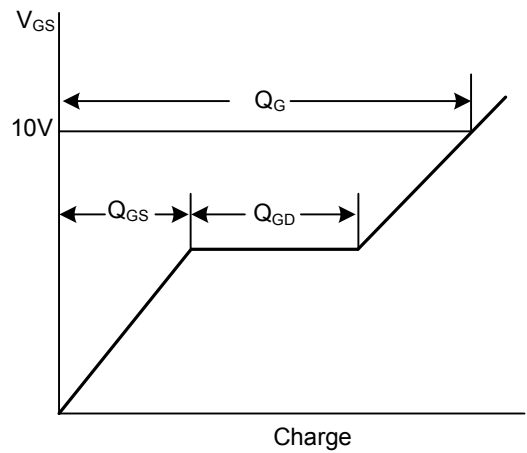
■ TEST CIRCUITS AND WAVEFORMS

Peak Diode Recovery dv/dt Test Circuit & Waveforms

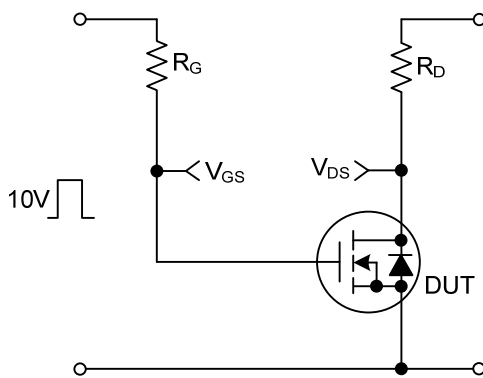
Gate Charge Test Circuit



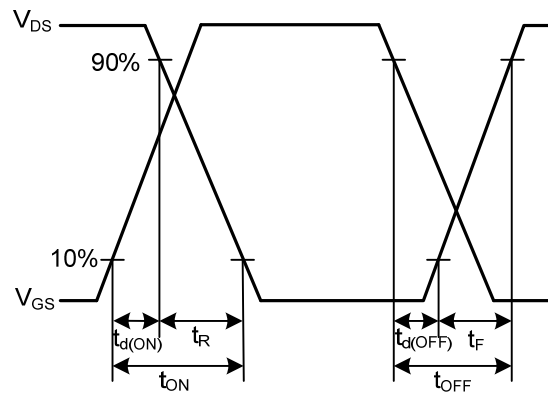
Gate Charge Waveforms



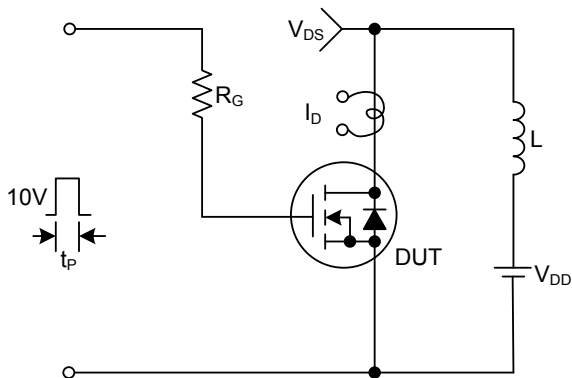
Resistive Switching Test Circuit



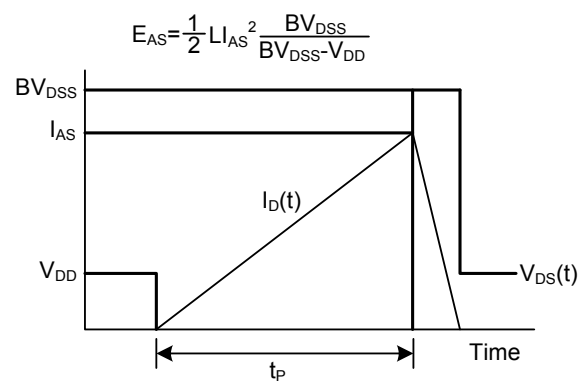
Resistive Switching Waveforms



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



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