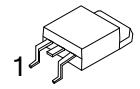
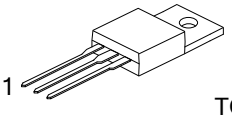
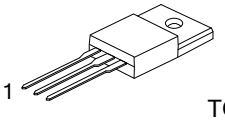
6A, 400V N-CHANNEL POWER MOSFET



TO-252



TO-220



TO-220F

■ DESCRIPTION

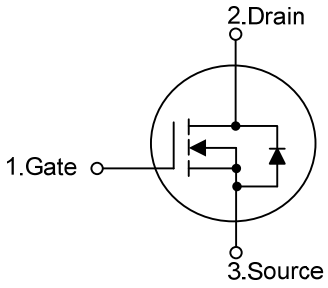
The UTC **6N40** is an N-Channel enhancement mode power MOSFET using UTC's perfect planar stripe, DMOS technology to provide customers with superior switching performance and minimum on-state resistance. It also can withstand high energy pulse in the avalanche and commutation mode.

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

* I_D= 6A
* V_{DS}=400V
* $R_{DS(ON)}$=1.0Ω @ 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-TA3-T	6N40G-TA3-T	TO-220	G	D	S	Tube
6N40L-TF3-T	6N40G-TF3-T	TO-220F	G	D	S	Tube
6N40L-TN3-R	6N40G-TN3-R	TO-252	G	D	S	Tape Reel

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

6N40L - TA3 - T

(1) Packing Type
(2) Package Type
(3) Lead Free

(1) T: Tube, R: Tape Reel
(2) TA3: TO-220, TF3: TO-220F, TN3: TO-252
(3) G: Halogen Free, L: Lead Free

■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°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 2)			I_{AR}	6	A
Drain Current	Continuous		I_D	6 (Note 5)	A
	Pulsed (Note 2)		I_{DM}	24(Note 5)	A
Avalanche Energy	Single Pulsed (Note 3)		E_{AS}	270	mJ
	Repetitive (Note 2)		E_{AR}	7.3	mJ
Peak Diode Recovery dv/dt (Note 4)			dv/dt	4.5	V/ns
Power Dissipation		TO-220	P_D	73	W
		TO-220F		38	
		TO-252		62.5	
Junction Temperature			T_J	+150	°C
Storage Temperature			T_{STG}	-55 ~ +150	°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. Repetitive Rating : Pulse width limited by maximum junction temperature
3. L=13.7mH, I_{AS}=6A, V_{DD}= 50V, R_G=25Ω, Starting T_J=25°C
4. I_{SD} ≤6A, di/dt ≤200A/μs, V_{DD} ≤BV_{DSS}, Starting T_J=25°C
5. Drain current limited by maximum junction temperature

■ THERMAL DATA

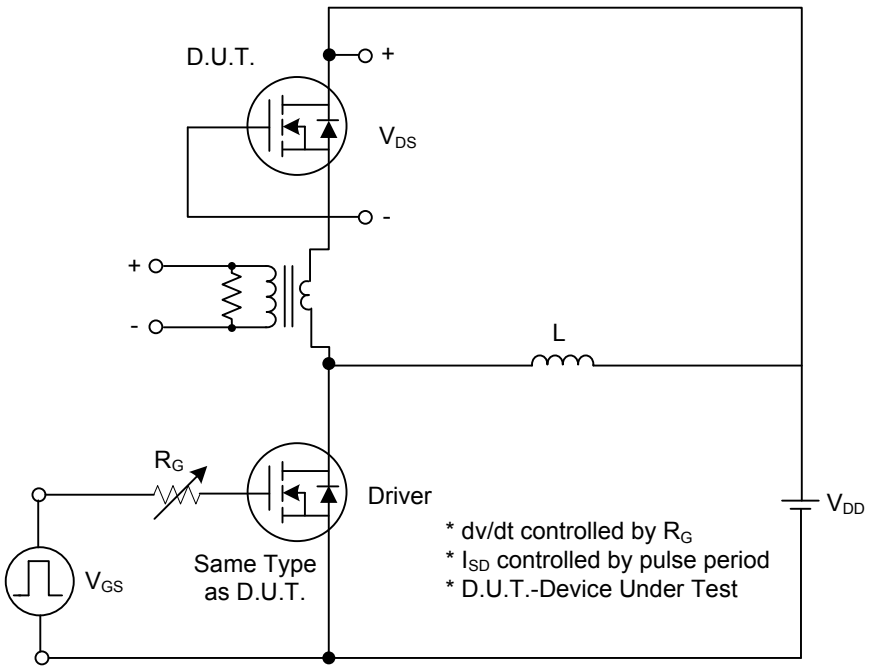
PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220 / TO-220F	θ_{JA}	62.5	°C/W
	TO-252		110	
Junction to Case	TO-220	θ_{JC}	1.71	°C/W
	TO-220F		3.31	
	TO-252		2.0	

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

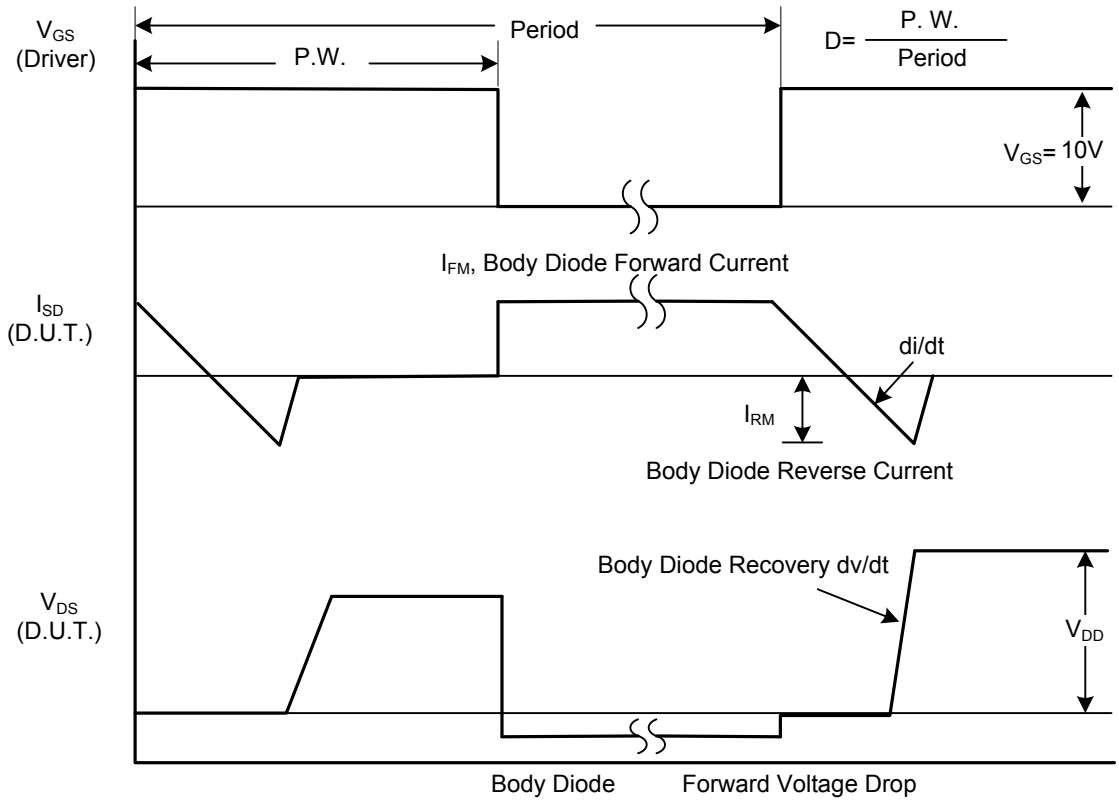
PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V, I_D=250μA	400			V
Breakdown Voltage Temperature Coefficient		$\Delta BV_{DSS}/\Delta T_J$	I_D=250μA, Referenced to 25°C		0.54		V/°C
Drain-Source Leakage Current		I_{DSS}	V_{DS}=400V, 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
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 1,2)		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 1,2)		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, dI_F/dt=100A/μs (Note 1)		230		ns
Body Diode Reverse Recovery Charge		Q_{RR}			1.7		μC

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

■ TEST CIRCUITS AND WAVEFORMS

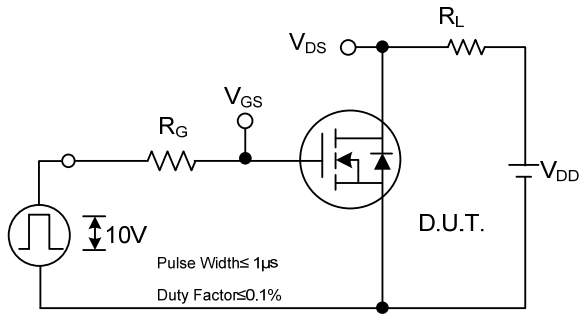


Peak Diode Recovery dv/dt Test Circuit

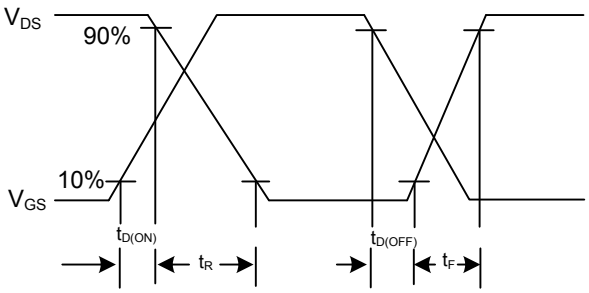


Peak Diode Recovery dv/dt Waveforms

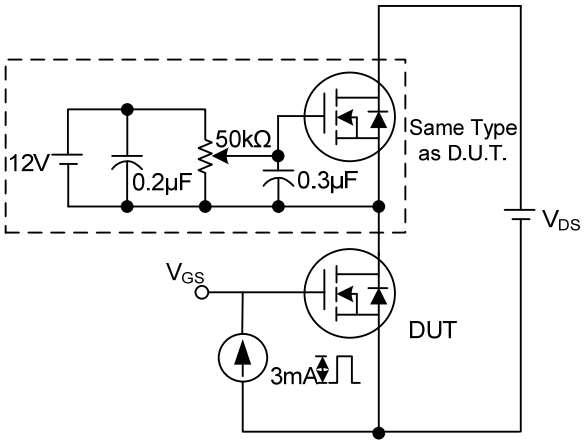
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



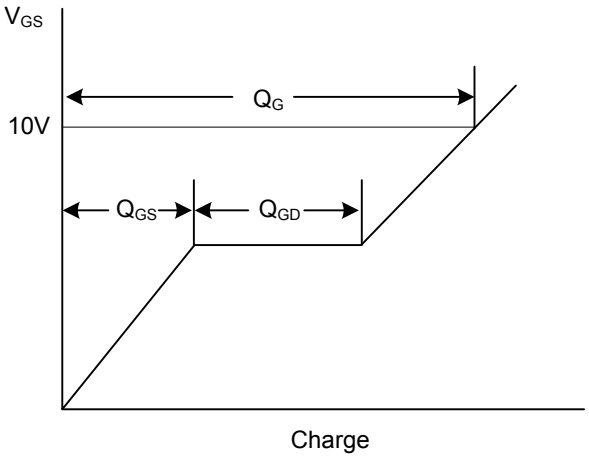
Switching Test Circuit



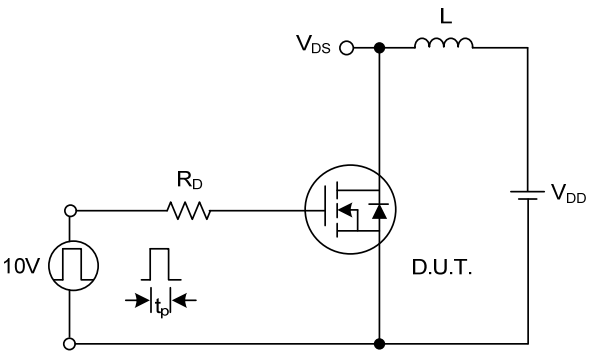
Switching Waveforms



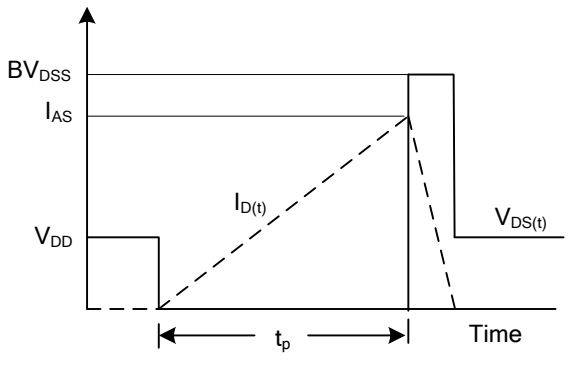
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms