



6N40K-TA

Preliminary

Power MOSFET

**6A, 400V N-CHANNEL
POWER MOSFET**

■ DESCRIPTION

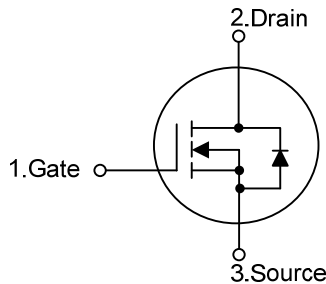
The UTC **6N40K-TA** is an N-Channel enhancement mode power MOSFET using UTC's perfect planar stripe, DMOS technology to provide customers with superior switching performance and minimum on-state resistance. It also can withstand high energy pulse in the avalanche and commutation mode.

The UTC **6N40K-TA** is generally used in applications , such as electronic lamp ballasts based on half bridge topology and high efficiency switched mode power supplies.

■ FEATURES

- * $R_{DS(ON)} < 0.6\Omega @ V_{GS}=10V, I_D=3A$
- * Fast switching speed
- * Improved dv/dt capability

■ SYMBOL



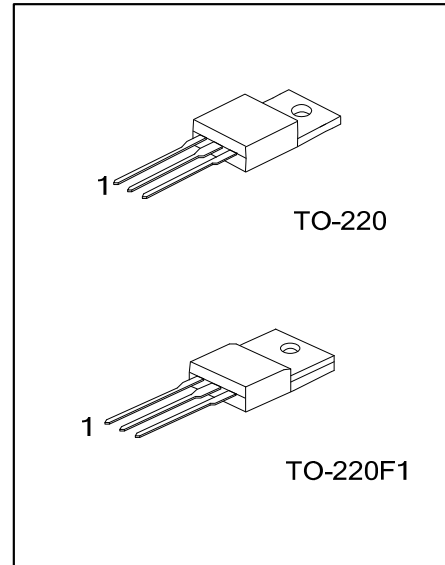
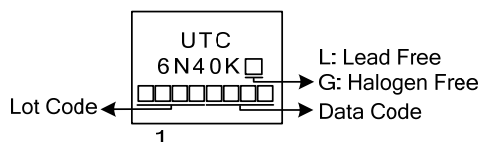
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N40KL-TA3-T	6N40KG-TA3-T	TO-220	G	D	S	Tube
6N40KL-TF1-T	6N40KG-TF1-T	TO-220F1	G	D	S	Tube

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

<p>6N40KL-TA3-T</p> <p>(1)Packing Type</p> <p>(2)Package Type</p> <p>(3)Green Package</p>	<p>(1) T: Tube</p> <p>(2) TA3: TO-220, TF1: TO-220F1</p> <p>(3) L: Lead Free, G: Halogen Free and Lead Free</p>
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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_{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}	240	mJ
	Repetitive (Note 2)	E_{AR}	8.5	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Power Dissipation	TO-220	P_D	73	W
	TO-220F1		38	
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. $L=13.5\text{mH}$, $I_{AS}=6\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
4. $I_{SD} \leq 6\text{A}$, $di/dt \leq 200\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, Starting $T_J=25^\circ\text{C}$
5. Drain current limited by maximum junction temperature

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	TO-220/TO-220F1	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	TO-220	θ_{JC}	1.71	$^\circ\text{C}/\text{W}$
	TO-220F1		3.31	

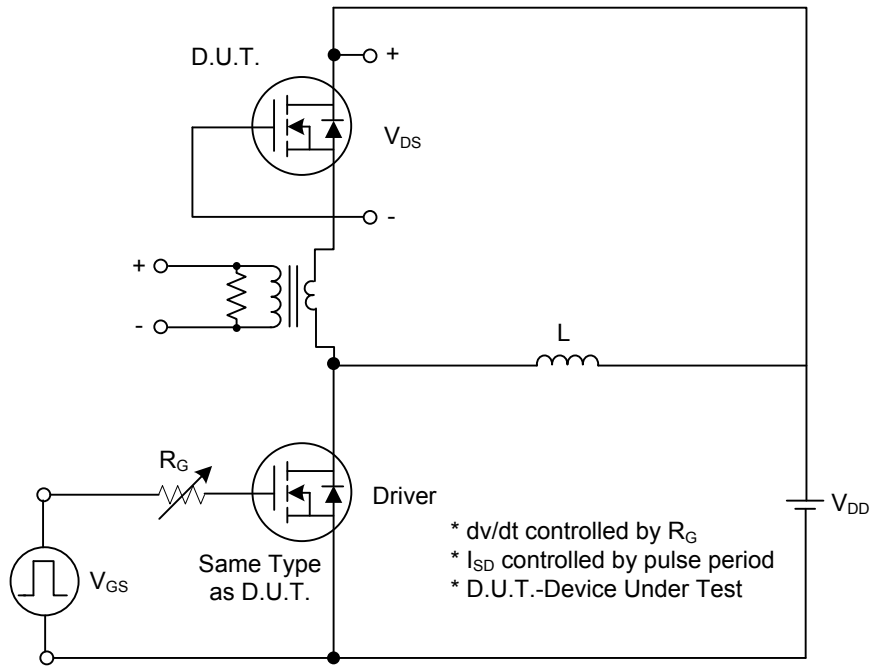
■ ELECTRICAL CHARACTERISTICS (T_c=25°C, unless otherwise specified)

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		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			0.6	Ω	
DYNAMIC PARAMETERS								
Input Capacitance		C _{ISS}	V _{DS} =25V, V _{GS} =0V, f=1.0MHz		490		pF	
Output Capacitance		C _{OSS}				95		pF
Reverse Transfer Capacitance		C _{RSS}				8.4		pF
SWITCHING PARAMETERS								
Total Gate Charge		Q _G	V _{DS} =50V, V _{GS} =10V, I _D =1.3A (Note 1,2)		65		nC	
Gate-Source Charge		Q _{GS}				6.2		nC
Gate-Drain Charge		Q _{GD}				8.8		nC
Turn-ON Delay Time		t _{D(ON)}	V _{DD} =30V, I _D =0.5A, R _G =25Ω V _{GS} =10V (Note 1,2)		60		ns	
Turn-ON Rise Time		t _R				65		ns
Turn-OFF Delay Time		t _{D(OFF)}				105		ns
Turn-OFF Fall Time		t _F				44		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, V _R =50V			300	ns	
Body Diode Reverse Recovery Charge		Q _{RR}	di _F /dt=100A/μs (Note 1)			1.75	μC	

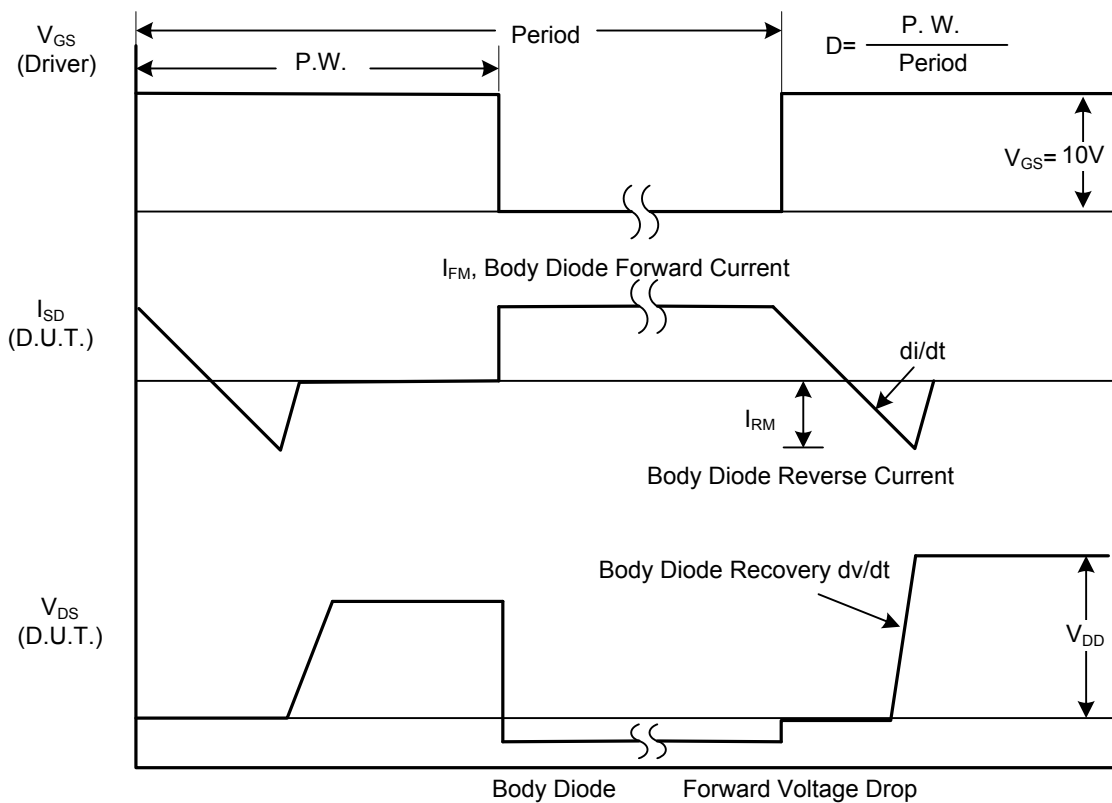
Notes: 1. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

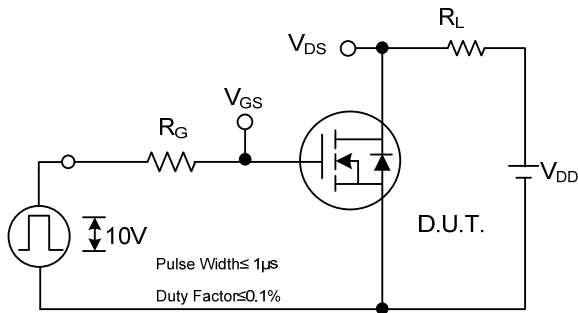


Peak Diode Recovery dv/dt Test Circuit

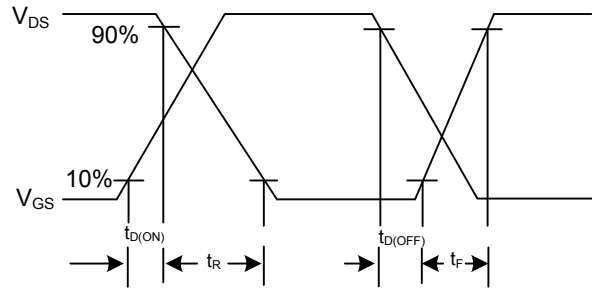


Peak Diode Recovery dv/dt Waveforms

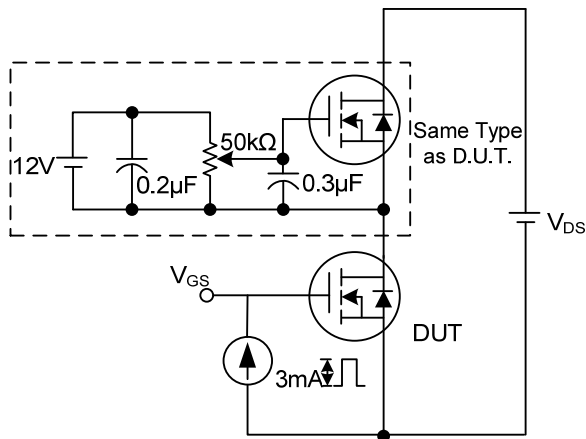
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



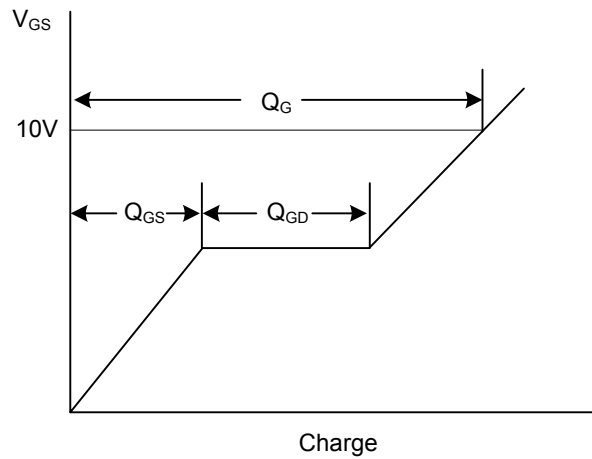
Switching Test Circuit



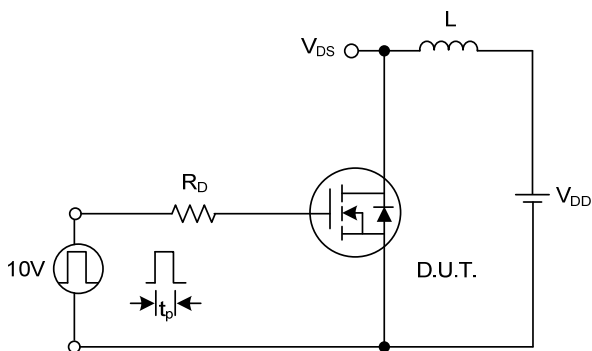
Switching Waveforms



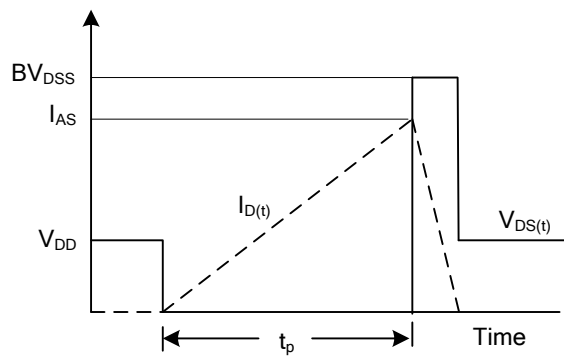
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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