

6A, 400V N-CHANNEL POWER MOSFET

DESCRIPTION

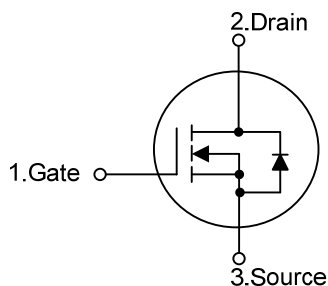
The **6N40** is an N-Channel enhancement mode power MOSFET using perfect planar stripe, DMOS technology to provide customers with superior switching performance and minimum on-state resistance. It also can withstand high energy pulse in the avalanche and commutation mode.

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

FEATURES

- * $R_{DS(ON)}=1.0\Omega @ V_{GS}=10V$
- * Fast switching speed
- * Improved dv/dt capability

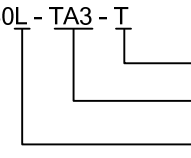
SYMBOL

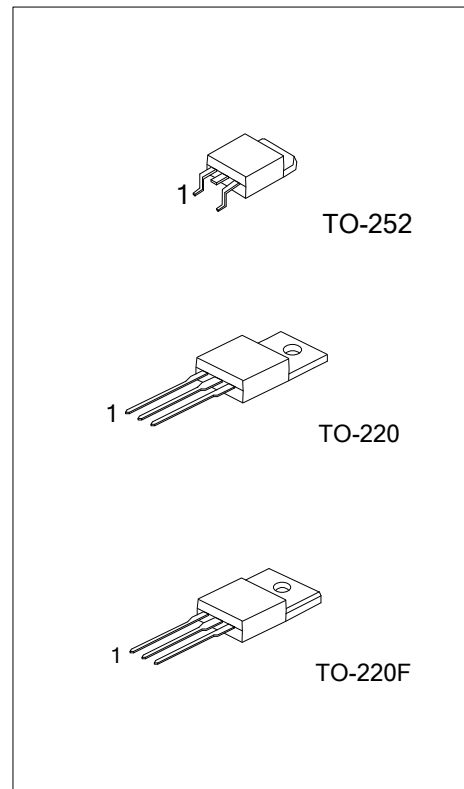


ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
6N40L-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
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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 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}	330	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-220F		38	
	TO-252		62.5	
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. $L=19\text{mH}$, $I_{AS}=5.5\text{A}$, $V_{DD}=50\text{V}$, $R_G=25\Omega$, 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-220F	θ_{JA}	62.5	$^\circ\text{C}/\text{W}$
	TO-252		110	
Junction to Case	TO-220	θ_{JC}	1.71	$^\circ\text{C}/\text{W}$
	TO-220F		3.31	
	TO-252		2.0	

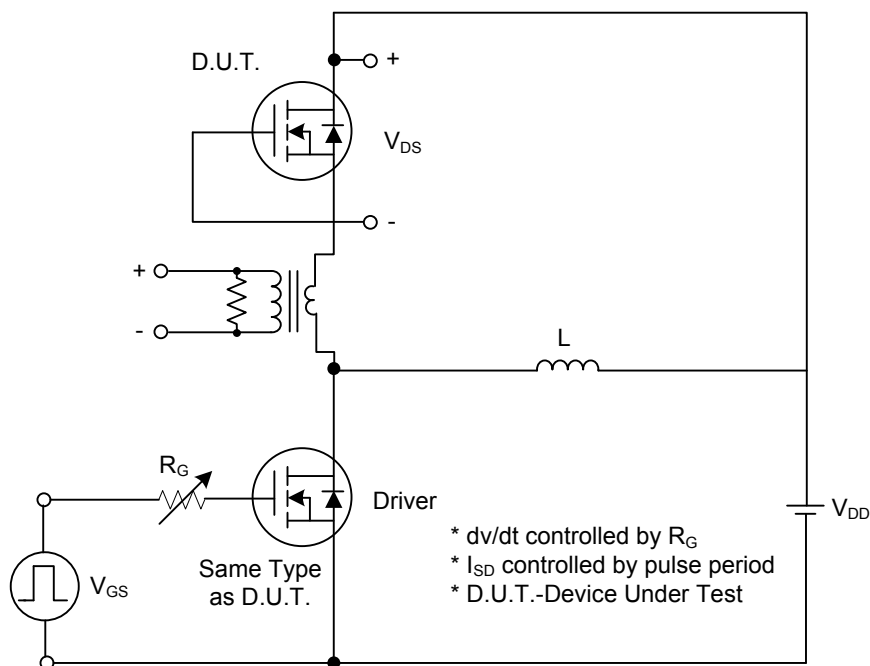
■ **ELECTRICAL CHARACTERISTICS** ($T_C=25^\circ\text{C}$, unless otherwise specified)

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		0.8	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,		230		ns
Body Diode Reverse Recovery Charge		Q _{RR}	dI _F /dt=100A/μs (Note 1)		1.7		μC

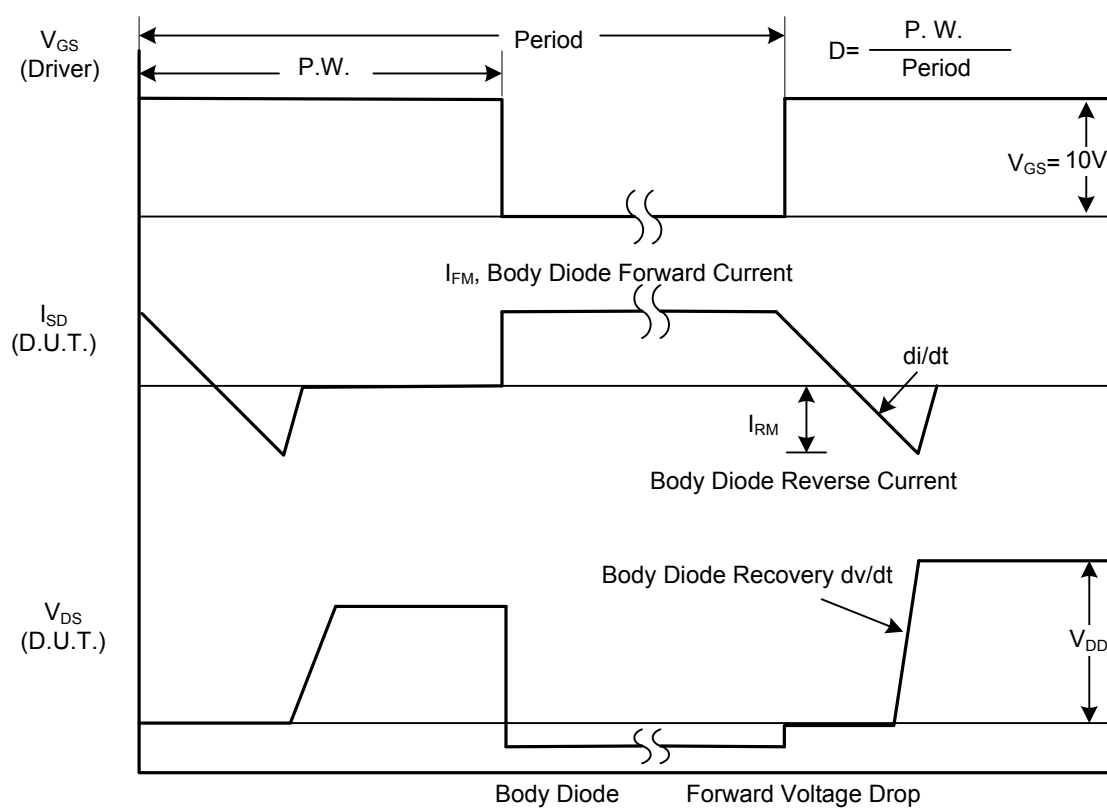
Notes: 1. Pulse Test : Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$

2. Essentially independent of operating temperature

■ TEST CIRCUITS AND WAVEFORMS

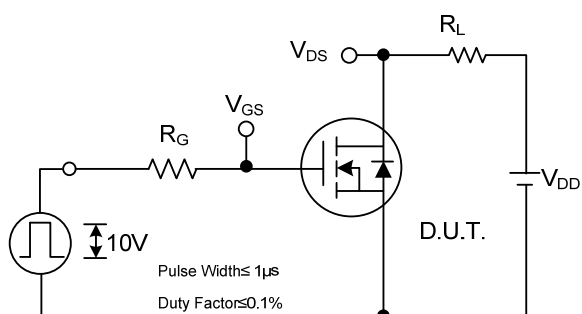


Peak Diode Recovery dv/dt Test Circuit

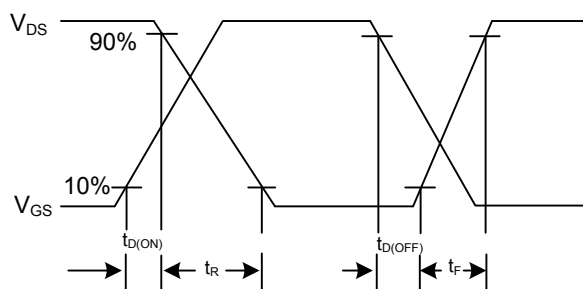


Peak Diode Recovery dv/dt Waveforms

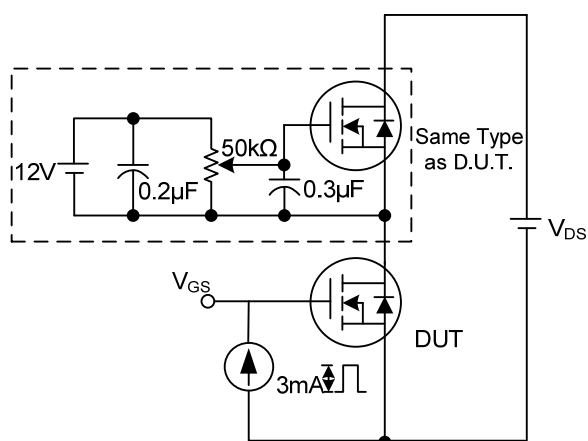
■ TEST CIRCUITS AND WAVEFORMS(Cont.)



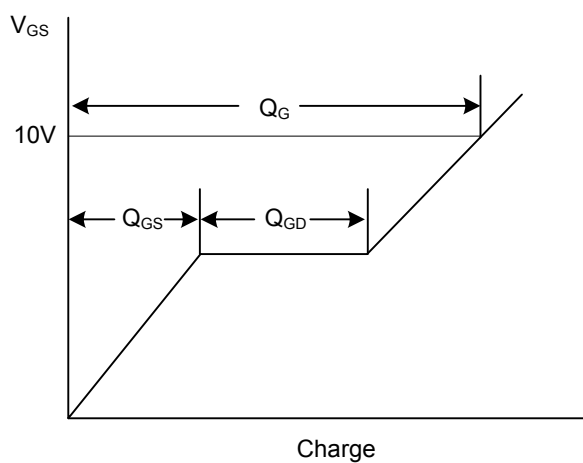
Switching Test Circuit



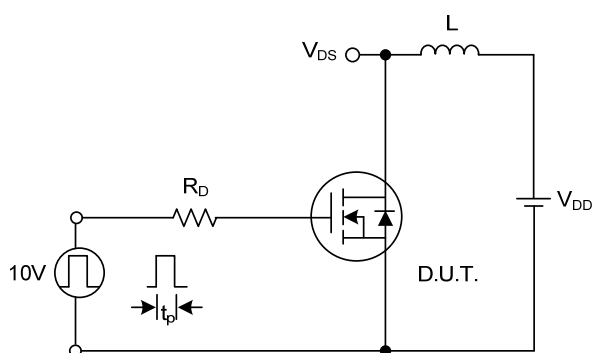
Switching Waveforms



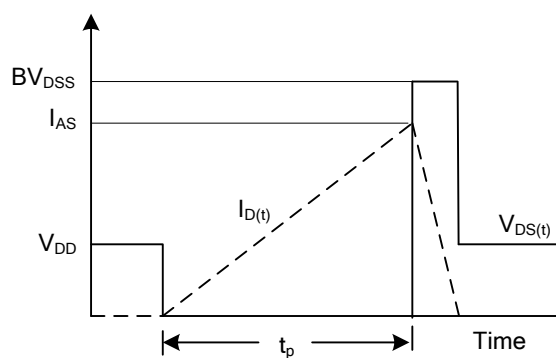
Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms