



## 25N40

Preliminary

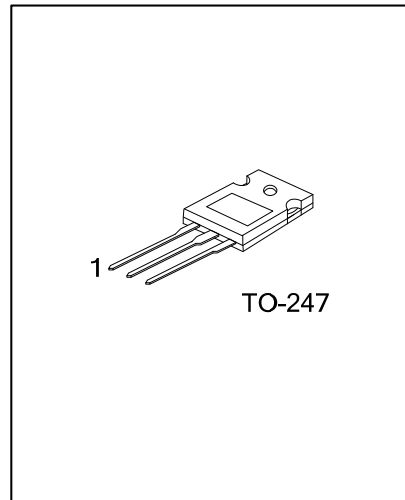
Power MOSFET

### 400V, 26A N-CHANNEL POWER MOSFET

#### DESCRIPTION

The UTC **25N40** is an N-channel mode power MOSFET using UTC's advanced technology to provide customers with planar stripe and DMOS technology. This technology allows a minimum on-state resistance and superior switching performance. It also can withstand high energy pulse in the avalanche and commutation mode.

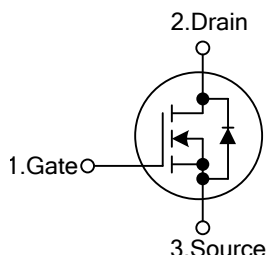
The UTC **25N40** is generally applied in high efficiency switch mode power supplies.



#### FEATURES

- \*  $R_{DS(ON)}=0.16\Omega @ V_{GS}=10V, I_D=13A$
- \* Low Gate Charge (Typical 48nC)
- \* Low  $C_{RSS}$  (Typical 30pF)
- \* High Switching Speed

#### SYMBOL



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
25N40L-T47-T	25N40G-T47-T	TO-247	G	D	S	Tube

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

<p>25N40L-T47-T</p> <ul style="list-style-type: none"> <li>(1)Packing Type</li> <li>(2)Package Type</li> <li>(3)Lead Free</li> </ul>	<ul style="list-style-type: none"> <li>(1) T: Tube</li> <li>(2) T47: TO-247</li> <li>(3) G: Halogen Free, L: Lead Free</li> </ul>
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■ ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ\text{C}$ , unless otherwise specified) (Note 5)

PARAMETER		SYMBOL	RATINGS	UNIT	
Drain to Source Voltage		$V_{DSS}$	400	V	
Gate-Source Voltage		$V_{GSS}$	$\pm 30$	V	
Drain Current (Note 5)	Continuous	$I_D$	$T_C=25^\circ\text{C}$	26	A
			$T_C=100^\circ\text{C}$	15.6	A
Pulsed (Note 2)		$I_{DM}$	104	A	
Avalanche Current (Note 2)		$I_{AR}$	26	A	
Avalanche Energy	Single Pulsed (Note 3)	$E_{AS}$	1352	mJ	
	Repetitive (Note 2)	$E_{AR}$	26.5	mJ	
Peak Diode Recovery $dv/dt$ (Note 4)		$dv/dt$	4.5	V/ns	
Power Dissipation ( $T_C=25^\circ\text{C}$ )		$P_D$	297	W	
Derate above $25^\circ\text{C}$			2.4	W/ $^\circ\text{C}$	
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.  $L=4\text{mH}$ ,  $I_{AS}=26\text{A}$ ,  $V_{DD}=50\text{V}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ\text{C}$
4.  $I_{SD}\leq 26\text{A}$ ,  $di/dt\leq 200\text{A}/\mu\text{s}$ ,  $V_{DD}\leq BV_{DSS}$ , Starting  $T_J=25^\circ\text{C}$
5. Drain current limited by maximum junction temperature

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	$\theta_{JA}$	40	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	0.42	$^\circ\text{C}/\text{W}$

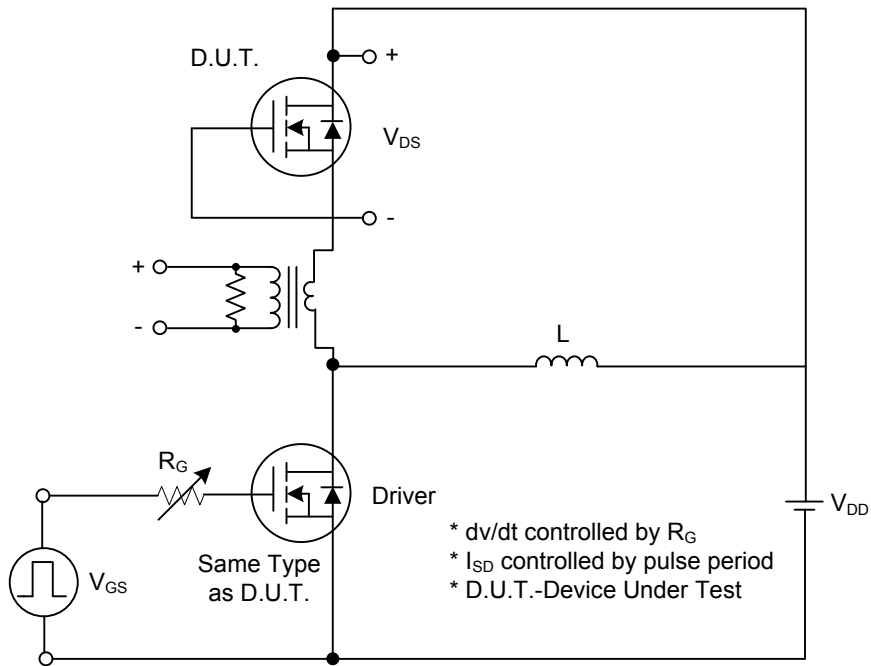
■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$I_D=250\mu A, V_{GS}=0V, T_J=150^\circ C$	400			V
Breakdown Voltage Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Reference to $25^\circ C, I_D=250\mu A$		0.5		V/ $^\circ C$
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=400V, V_{GS}=0V,$			1	$\mu A$
Gate- Source Leakage Current	Forward	$V_{GS}=+30V, V_{DS}=0V$			+100	nA
	Reverse	$V_{GS}=-30V, V_{DS}=0V$			-100	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=13A$		0.11	0.16	$\Omega$
<b>DYNAMIC PARAMETERS</b>						
Input Capacitance	$C_{ISS}$	$V_{DS}=25, V_{GS}=0V, f=1.0MHz$		2400	3185	pF
Output Capacitance	$C_{OSS}$			390	520	pF
Reverse Transfer Capacitance	$C_{RSS}$			30	45	pF
<b>SWITCHING PARAMETERS</b>						
Total Gate Charge	$Q_G$	$V_{DS}=320V, V_{GS}=10V, I_D=26A$ (Note 1, 2)		48	60	nC
Gate to Source Charge	$Q_{GS}$			15		nC
Gate to Drain ("Miller") Charge	$Q_{GD}$			20		nC
Turn-ON Delay Time	$t_{D(ON)}$	$V_{DD}=200V, I_D=26A, R_G=25\Omega$ (Note 1, 2)		45	100	ns
Rise Time	$t_R$			100	210	ns
Turn-OFF Delay Time	$t_{D(OFF)}$			115	240	ns
Fall-Time	$t_F$			66	140	ns
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Maximum Body-Diode Continuous Current	$I_S$				26	A
Maximum Body-Diode Pulsed Current	$I_{SM}$				104	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$I_{SD}=26A, V_{GS}=0V$			1.4	V
Body Diode Reverse Recovery Time	$t_{rr}$	$I_{SD}=26A, V_{GS}=0V,$		406		ns
Body Diode Reverse Recovery Charge	$Q_{RR}$	$di_F/dt=100A/\mu s$ (Note 1)		5.17		$\mu C$

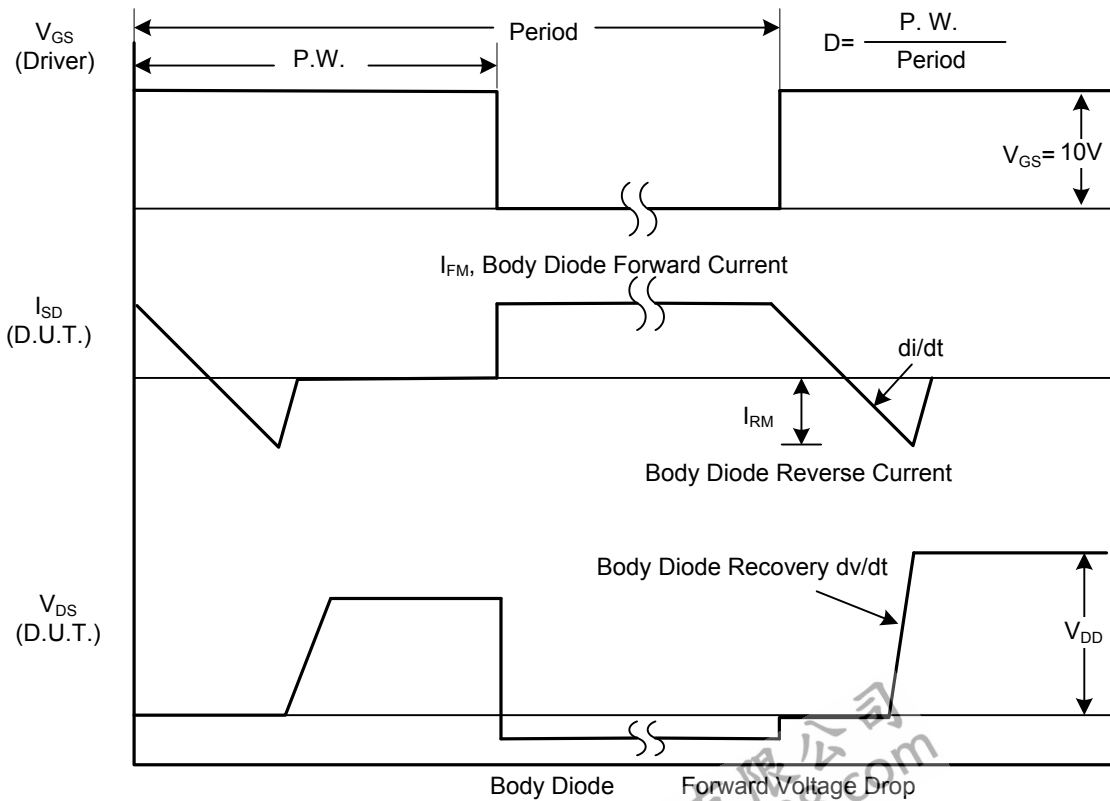
Notes: 1. Pulse Test: Pulse width $\leq 300\mu s$ ; Duty Cycle $\leq 2\%$ .

2. Essentially Independent of Operating Temperature Typical Characteristics

TEST CIRCUITS AND WAVEFORMS

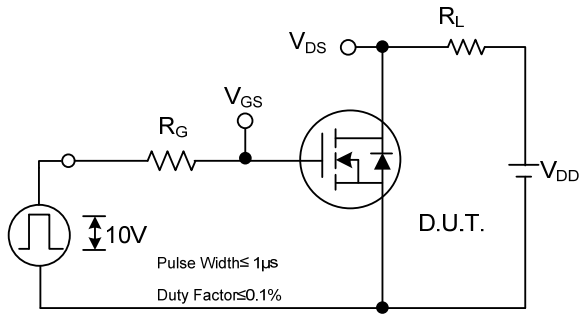


Peak Diode Recovery  $dv/dt$  Test Circuit

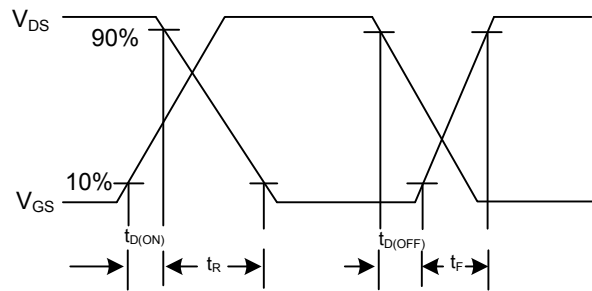


Peak Diode Recovery  $dv/dt$  Waveforms

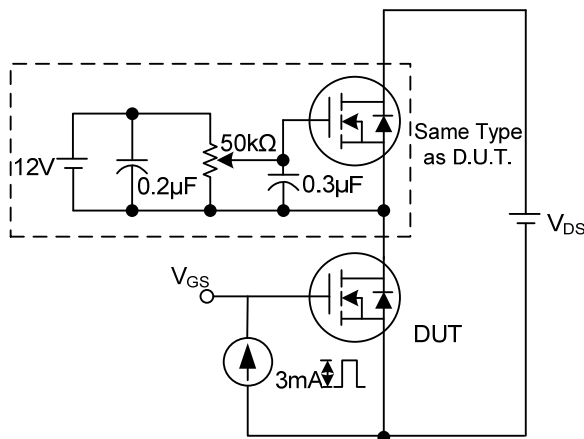
■ TEST CIRCUITS AND WAVEFORMS (Cont.)



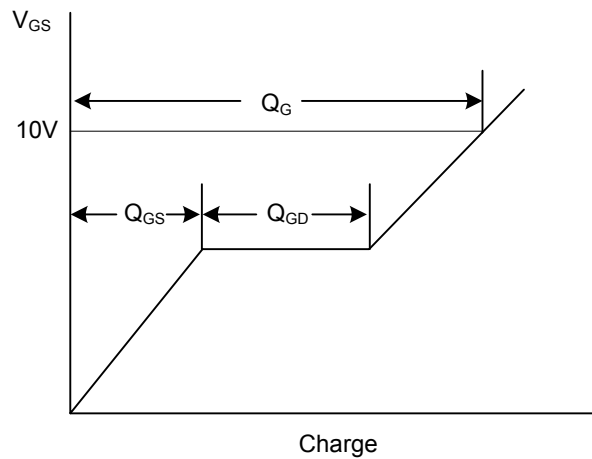
Switching Test Circuit



Switching Waveforms

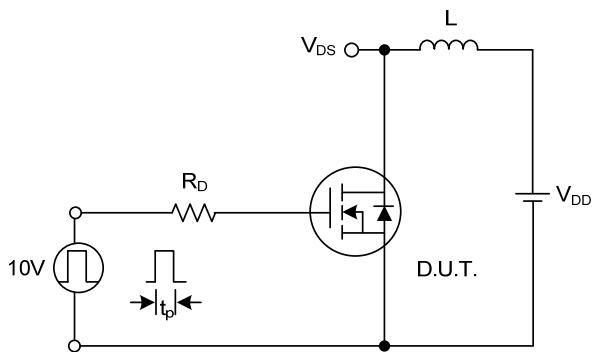


Gate Charge Test Circuit

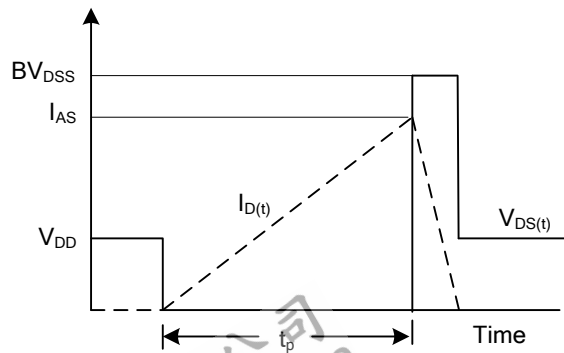


Charge

Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

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